

MINERALOGICAL ABSTRACTS

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Notices of Books.

KNOFF (Eleanora Bliss) & INGERSON (Earl). *Structural petrology*. Mem. Geol. Soc. Amer., 1938, no. 6, xv+270 pp., 27 pls., 81 text-figs.

This book gives a very lucid account of the new and rather intricate science of structural petrology or petrotectonics. In part I (pp. 1-208) the principles of structural petrology are discussed by E. B. Knopf. These include many topics such as the preferred orientation of rock-forming minerals, kinematic analysis of rock fabric, types of fabrics, and plastic deformation of crystals and rocks. In part II (pp. 211-262) the laboratory technique, including the correct orientation of rock sections, the manipulation of the universal stage, and the preparation of petrofabric diagrams, is discussed by E. Ingerson. The book is well got up and profusely illustrated by diagrams and photographs.

S. I. T.

BUDDINGTON (A. F.). *Adirondack igneous rocks and their metamorphism*. Mem. Geol. Soc. America, 1939, no. 7, xv+354 pp., 21 pls., 30 text-figs.

This is a detailed description of the Adirondack intrusive complex, the intrusive sequence of which is postulated as (a) anorthosite, gabbroic anorthosite, gabbro, (b) diorite, (c) syenite, and (d) granite. Former evidence for the order of intrusions is revised and certain chill zones are interpreted as 'pseudo-chill' zones due to contact metamorphism of the older rocks by the younger magma. The intrusive forms are very complex. The foliation of the main anorthosite mass indicates domical surfaces in the roof, but no positive evidence for a base was found. Other igneous masses occur in the form of sheet-like masses. The structural analysis, especially the study of foliation, suggests that the structure of the igneous masses was determined by regional orogenetic stresses. Petrogenesis, contact and regional metamorphism, and structural relations are discussed in great detail. Many (97) new chemical analyses and a number of modal analyses are given.

S. I. T.

HARKER (Alfred) [1859–1939]. *The west Highlands and the Hebrides. A geologist's guide for amateurs.* Cambridge (University Press), 1941, xxiii+128 pp., 1 pl., 89 text-figs. Price 8s. 6d.

A brief, general account of the rock formations to be found in the region is followed by a bird's-eye view of the scenery and geology of the west coast of Scotland and the islands. The book is divided into fifteen concise chapters and should make a useful and interesting handbook for the amateur geologist on a series of summer cruises and excursions. The text is illustrated with eighty-one topographical and geological pen-and-ink sketches and eight maps, and a glossary of geological terms, &c., is given at the end. This posthumous work has been edited and completed by J. E. Richey and is prefaced by an appreciation of the author by the late Sir A. C. Seward. It is unfortunate that, owing to war-time conditions, the book should be rather expensive for some of those whom it is intended to interest. J. M. S.

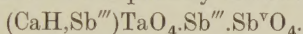
New Minerals.

WRETLAD (P. E.). *Minerals of the Varuträsk pegmatite. XX. Die Allemontite und das System As-Sb.* Geol. För. Förh. Stockholm, 1941, vol. 63, pp. 19–48, 9 figs. [Nos. XVI–XXI, M.A. 8—101, 103.]

A review is given of the literature on artificial As-Sb alloys and of allemontite. The former show a continuous series of mixed crystals. The latter shows breaks on either side of AsSb, and three types are distinguished: allemontite I consisting of a mixture of the Sb phase and AsSb; allemontite II of AsSb, which is named *stibarsen*; allemontite III consisting of a mixture of the As phase and AsSb. New analyses (by T. Berggren) of allemontite from Varuträsk, Sweden [M.A. 6–486], gave for type I As 22.2, Sb 62.0 %, and for type III (not previously described from Varuträsk, but the predominating type) As 50.55, Sb 49.35 %, together with small amounts of Ag, Au, Bi, Fe, S. Allemontite I from Allemont, France (from here only type III has been previously described), gave As 36.0, Sb 62.2 %, &c., sp. gr. 6.332. Etching reactions are given for the different types, showing a eutectoid structure in types I and III; but material from other localities has a gel structure. Material of type III when treated with a boiling concentrated solution of sodium hypochlorite (NaClO) leaves a residue of AsSb, the As phase being more readily dissolved. After fusion, the natural mineral of types I and III still shows a heterogeneous structure. A new equilibrium diagram shows at a higher temperature a continuous series, and at a lower temperature two areas corresponding to types I and III. L. J. S.

BERGGREN (Thelma). *Minerals of the Varuträsk pegmatite. XXII. Two new analyses of stibiomicrolite*. Geol. För. Förh. Stockholm, 1941, vol. 63, pp. 52-58, 1 fig.

Later finds of stibiomicrolite [M.A. 7-120] are from two quarries worked for petalite together with some spodumene and pollucite. Allemonite was also found nearby. This material shows a more metallic lustre, due to the presence of native antimony, than that previously analysed. Two new analyses gave Ta_2O_5 54.20 (44.27), Nb_2O_5 7.52 (10.83), Sb_2O_3 14.63 (21.28), Sb soluble in HCl 10.80 (13.40), Bi_2O_3 0.02 (0.13), SiO_2 1.36 (0.60), Al_2O_3 0.66 (trace), Fe_2O_3 0.32 (trace), MnO 1.28 (—), MgO trace (0.00), CaO 7.38 (6.12), Na_2O 0.90 (1.55), K_2O 0.11 (0.19), $\text{H}_2\text{O} +$ 1.20 (1.31), $\text{H}_2\text{O} -$ 0.06 (0.07), total 99.84 (99.75). A suggested composition of the primary mineral is:



Analysis of a micaceous mineral in the cleavages of the stibiomicrolite proves it to be oncosine.

L. J. S.

FRONDEL (Clifford). *Whitlockite: a new calcium phosphate, $\text{Ca}_3(\text{PO}_4)_2$* . Amer. Min., 1941, vol. 26, pp. 145-152, 3 figs. Abstract, p. 197.

Details of a paper previously published in abstract [M.A. 8-52] with revision of the X-ray data. Crystals (1 mm.-1.5 cm.) occur in cavities of granular whitlockite, associated with rhodochrosite, apatite, &c. Colourless to white acute rhombohedra (01 $\bar{1}$ 2) [not (10 $\bar{1}$ 4) as stated in the abstract] are truncated by (10 $\bar{1}$ 4), (0001), and (11 $\bar{2}$ 0); $a:c = 1:3.5473$. A revision of the dimensions of the unit cell gave a 10.32, c 39.9 Å., and the space-group $R\bar{3}c$ is doubtful. Analysis by F. A. Gonyer gave P_2O_5 45.68, CaO 46.90, MgO 2.53, Fe_2O_3 1.73, FeO 1.91, F 0.06, Cl trace, H_2O 0.48, insol. 0.51 = 99.80. Although the physical characters are very like those of apatite there is a difference in the cell dimensions. X-ray powder photographs are given of apatite, graftonite, caryinite, and fillowite, showing differences from that of whitlockite. Fillowite from Branchville, Connecticut, has $\alpha = \beta$ 1.671, γ 1.676, 2V small, positive, Bx_a nearly \perp cleavage. Some notes are added on other minerals from the Palermo pegmatite quarry on Bald Face Mountain, North Groton, New Hampshire [M.A. 3-360].

L. J. S.

FRONDEL (Clifford). *Constitution and polymorphism of the pyroaurite and sjögrenite groups*. Amer. Min., 1941, vol. 26, pp. 295-315, 3 figs. Abstract, pp. 196-197.

Full details of a paper previously published in abstract [M.A. 8-51]. A review is given of the literature. In the rhombohedral series, pyro-

aurite (d 2·14) is noted from eight localities, stichtite from three, and hydrotalcite from four. In the hexagonal series of new species, sjögrenite (d 2·11) is noted from Långban, Sweden; barbertonite (d 2·10) from Dundas (Tasmania), Barberton (Transvaal), and probably Cunningsburgh (Shetland Islands) [Min. Mag. **23**–309]; and manasseite (d 2·05) from Snarum and Kongsberg (Norway) and Amity (New York). Analysis by F. A. Gonyer of manasseite from Snarum gave (figures in brackets after deducting SiO_2 and 6·38 % gibbsite) MgO 36·76 (39·38), Fe_2O_3 0·20 (0·21), Al_2O_3 19·65 (16·59), CO_2 6·98 (7·48), H_2O 36·13 (36·34), SiO_2 0·35 (—), totals 100·07 (100·00). Laue photographs of manasseite and of barberton-stichtite intergrowths show complete concentric circles, owing to the random stacking of plates on (0001). Brugnatellite, $\text{Mg}_6\text{Fe}(\text{OH})_{13}\text{CO}_3\cdot 4\text{H}_2\text{O}$, is distinct from these minerals. Houghite is identical with hydrotalcite.

L. J. S.

GUIMARÃES (Caio Pandiá). *Djalmaite, a new radio-active mineral*. Amer. Min., 1941, vol. 26, pp. 343–346, 5 figs.

Translation of a paper previously published [M.A. **8**–2], with correction of the author's name and the total (99·65) of the chemical analysis.

L. J. S.

MYASNIKOV (V. S.) МЯСНИКОВ (B. C.). *On titaniferous vesuvianite from the Perovskite and Akhmat mines at the south Urals*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 28, pp. 446–449, 2 figs.

In the Perovskite mine, Chuvash Mts., dark brown idocrase occurs in chlorite-pyroxene-rock with limestones. The crystals are prismatic with large (001) and show nine crystal-forms, $a:c = 1:0\cdot5374$, a 15·61, c 11·83 Å.; ω 1·736, ϵ 1·730; analysis I (also B_2O_3 , Cl, traces). In the Akhmat mine, Shishim Mts., there is a similar occurrence of dark brown idocrase as rough crystals and granular masses; analysis II (also B_2O_3 , F, traces), ω 1·742, ϵ 1·736. This 'titaniferous vesuvianite' is compared with similar material from Vesuvius and Dungannon, Ontario [M.A. **3**–118]. The refractive indices increase with the amount of Ti, and the brown colour seems to depend on the presence of Ti.

	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	H_2O	Total	Sp. gr.
I.	36·89	4·63	13·71	4·21	0·82	0·07	1·73	35·89	2·71	100·66	3·409
II.	35·73	4·73	12·66	4·36	1·55	0·07	2·91	35·87	2·76	100·64	3·408

L. J. S.

SHILIN (L. L.) ШИЛИН (Л. Л.). *Titanovesuvianite from the Perovskite mine in the Chuvash mountains at the south Urals*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 29, pp. 325–327, 3 figs.

Brown prismatic crystals of idocrase are of two habits according to the large or small size of the basal plane. Fourteen crystal-forms are noted; $a:c = 1:0.5375$, 'No' 1.729, 'Ne' 1.733. The mineral contains 4.59 % TiO_2 and is regarded as an independent variety. L. J. S.

FLINT (E. P.), McMURDIE (Howard F.), & WELLS (Lansing S.). *Hydrothermal and X-ray studies of the garnet-hydrogarnet series and the relationship of the series to hydration products of Portland cement*. Journ. Research U.S. Bur. Standards, 1941, vol. 26, pp. 13–33, 2 pls., 4 text-figs.

The compounds listed below, together with a complete series of mixed crystals containing 2–4 components, were prepared by treating glasses of various compositions (to represent the glass phase in Portland cement clinker) with water in a bomb at various temperatures and pressures. They were also obtained by adding Al and Fe chlorides to a boiling solution of $\text{Ca}(\text{OH})_2$, and by the hydration of $4\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{Fe}_2\text{O}_3$ (a constituent of Portland cement). The crystals are optically isotropic and have the form of cubes, octahedra, dodecahedra, or icositetrahedra, with space-group O_h^{10} . There is a replacement of SiO_2 by $2\text{H}_2\text{O}$, with vacant Si spaces in the structure. The hydrous members of the series are called *hydrogarnets*. Plazolite ($3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$) [M.A. 1–151, 254; 7–92] is an intermediate member of this series; it is recorded in hillebrandite from Velardeña, Mexico.

	Formula	n .	a .
Calcium aluminate ...	$3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$	1.605	12.56 Å.
Calcium ferrite ...	$3\text{CaO} \cdot \text{Fe}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$	1.710	12.74
Grossular ...	$3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2$	—	11.84
Andradite ...	$3\text{CaO} \cdot \text{Fe}_2\text{O}_3 \cdot 3\text{SiO}_2$	—	12.02

L. J. S.

Topographical Mineralogy.

QUENSEL (Percy), with analyses by BERGGREN (Thelma). *Minerals of the Varuträsk pegmatite. XVI. Lithiophilite, a third primary alkali-manganese phosphate from Varuträsk*. Geol. För. Förh. Stockholm, 1940, vol. 62, pp. 291–296.

——— XVII. *Further comments on the minerals varulite and alluaudite*. Ibid., pp. 297–302. [No. XV, M.A. 8–22.]

Since the first paper of this series [M.A. 6–485] lithiophilite has been found in small amount in this deposit. Light olive-green semi-translucent

material, with α 1.660, γ 1.678, $2E$ $64^\circ 18'$, gave analysis I (after deducting 10.3 % insoluble). Compared with earlier analyses (which are tabulated), this shows more Na_2O and CaO than usual. A new analysis (II) of lithiophilite from Wodgina, Western Australia [M.A. 3-131, 544] shows still more CaO , which may perhaps be present isomorphously as graftonite. New analyses are given of varulite (III and IV) and alluaudite (V) [M.A. 6-486], from which new formulae are provisionally suggested for these oxidation products of triphylite: varulite $[(Na, Mn'', Fe'')Fe''']PO_4$, alluaudite $(Na, Mn'', Fe''')PO_{4 \cdot x}(H, Na)_2O$. Headdenite [M.A. 6-486] is near to arrojadite [M.A. 3-113].

	P_2O_5	Fe_2O_3	FeO	MnO	MgO	CaO	Li_2O	Na_2O	K_2O	$H_2O +$	Total
I.	45.1	—	7.1	33.4	—	3.3	7.5	2.7	0.6	0.3	100.00
II.	43.43	—	7.45	30.53	—	9.70	5.51	1.48	0.17	1.74	100.41
III.	44.93	5.32	11.03	25.31	0.13	2.30	1.65	8.08	0.12	0.64	99.97
IV.	44.14	7.66	9.50	24.76	0.16	2.75	0.53	9.02	0.07	0.60	99.58
V.	42.76	16.44	1.98	26.24	nil	2.16	0.28	6.94	0.13	1.60	99.95

II, also Cl 0.07, F 0.10, H_2O — 0.07, insol. 0.16. III, H_2O — 0.18, insol. 0.28, Cl trace. IV, H_2O — 0.15, insol. 0.24, Cl trace. V, H_2O — 0.88, insol. 0.54.

TENGNÉR (Staffan). *Minerals of the Varuträsk pegmatite. XVIII. New amblygonite crystals from Varuträsk.* Geol. För. Förh. Stockholm, 1941, vol. 62 (for 1940), pp. 332-334.

Amblygonite is abundant at Varuträsk, but crystals are rare [M.A. 7-108]. Two large rough crystals show the forms $a c b m M$ [Dana's letters] and $e(021)$, and X-ray measurements gave a 4.97, b 6.99, c 5.25 Å., α 109.4° , β 98.4° , γ 106.3° , corresponding to axial ratios $a:b:c = 0.711:1:0.752$, which are closer to those of Dana than those of W. E. Richmond [M.A. 8-11].

L. J. S.

QUENSEL (Percy). *Minerals of the Varuträsk pegmatite. XIX. The uraninite minerals (ulrichite and pitchblende).* Geol. För. Förh. Stockholm, 1941, vol. 62 (for 1940), pp. 391-396.

Uraninite has been found in small amount as small cubes with semi-metallic lustre and steel-black colour (ulrichite, M.A. 3-106) and as nodular masses with dull non-metallic lustre (pitchblende); both of them are coated with yellow alteration products. Analysis by T. Berggren of the fresher material (ulrichite) gave U_3O_8 74.4, ThO_2 1.12, $(Ce, Yt)_2O_3$ 0.12, PbO 16.64, Fe_2O_3 0.03, MgO 0.03, CaO 0.16, SiO_2 0.16, insol. 0.32, volatile 6.1 = 99.08. Another partial analysis shows PbO 18.3 %, which is the highest recorded for uraninite, and gives an

excessive value for the age of the mineral. Determination by W. Wahl of the lead isotopes gave Pb^{206} 81.94, Pb^{207} 15.26, Pb^{208} 2.80 %.

L. J. S.

ALVFELDT (Olov). *Minerals of the Varuträsk pegmatite. XXI. X-ray study on kaolinite as an alteration product of spodumene from Varuträsk.* Geol. För. Förh. Stockholm, 1941, vol. 63, pp. 49–51, 1 fig. [Nos. XX and XXII, M.A. 8–98, 99.]

X-ray powder photographs of white powdery material [M.A. 7–120] are compared with those of nacrite from Schlaggenwald, Bohemia, dickite from Chihuahua, Mexico, and kaolinite from Cornwall, and found to be nearest to the last of these.

L. J. S.

MASON (Brian). *Alluaudite from the pegmatites at Sukula near Tammela in Finland.* Geol. För. Förh. Stockholm, 1941, vol. 62 (for 1940), pp. 369–372.

Alluaudite from Sukula forms irregular compact masses with dull green-black colour and dirty yellow-green streak. H. $5-5\frac{1}{2}$, sp. gr. 3.58. Under the microscope it shows a granular structure; α 1.752, γ 1.764. Analysis by T. Berggren gave P_2O_5 42.52, Fe_2O_3 20.56, FeO 3.19, MnO 20.66, MgO 0.11, CaO 2.70, Li_2O 0.07, Na_2O 8.19, $\text{H}_2\text{O}+$ 0.96, $\text{H}_2\text{O}-$ 0.17 insol. $1.06 = 100.19$. It is similar to the alluaudite from Varuträsk, Sweden, and like that is probably an alteration product of varulite [M.A. 6–486, 8–101]. The formula of alluaudite is given as $x(3\text{RO} \cdot \text{P}_2\text{O}_5) \cdot y(\text{Fe}_2\text{O}_3 \cdot \text{P}_2\text{O}_5)$.

L. J. S.

MASON (Brian). *Triploidite and varulite from the pegmatite at Skrumpetorp in Sweden.* Geol. För. Förh. Stockholm, 1941, vol. 62 (for 1940), pp. 373–379, 1 fig.

Triploidite occurs as small, finely granular, pale green masses embedded in dark green varulite; it has H. $5\frac{1}{2}$, sp. gr. 3.78, α 1.725, γ 1.731, and gave analysis I by T. Berggren; formula $3\text{RO} \cdot \text{P}_2\text{O}_5 \cdot \text{R}(\text{OH})_2$. An X-ray powder photograph of triploidite shows some similarity to that of triplite (which had been previously recorded from Skrumpetorp). Varulite [M.A. 6–486, 8–101] occurs as dark green, irregular nodules; it has H. 5, sp. gr. 3.61, α 1.708, γ 1.722, and gave analysis II by T. Berggren. It gives no simple formula.

	P_2O_5 .	Fe_2O_3 .	FeO .	MnO .	MgO .	CaO .	Na_2O .	$\text{H}_2\text{O}+$.	F.	Total.
I.	34.20	0.22	36.44	21.73	0.00	2.00	0.93	4.50	0.09	100.45
II.	44.60	6.44	12.01	21.06	0.09	3.60	9.72	1.52	0.08	99.70

I, also K_2O trace, $\text{H}_2\text{O}-$ 0.19, insol. 0.15. II, also K_2O trace, $\text{H}_2\text{O}-$ 0.14, insol. 0.44.

L. J. S.

GRIP (Erland). *A lithium pegmatite on Kluntarna in the archipelago of Piteå*. Geol. Förel. Förh. Stockholm, 1941, vol. 62 (for 1940), pp. 380–390, 4 figs.

A small dike on Kluntarna island, off the coast of Norrbotten, Sweden, shows similarities to those of Varuträsk (75 km. SW.). It shows a zonal banding: coarse microcline-perthite with quartz and black tourmaline at the margins; then spodumene; and the finer grained centre with lepidolite, albite, and coloured tourmalines. Spectrographic analysis of the microcline-perthite (2V 74°) gave Li_2O 0.02, Na_2O 4.65, K_2O 10.10, Rb_2O 1.85 %, Cs_2O nil, BaO trace. The spodumene is colourless and unaltered; α 1.653, β 1.659, γ 1.677, $c : \gamma = 25^\circ$, 2V 66°; analysis by T. Berggren gave SiO_2 65.05, Al_2O_3 26.70, Fe_2O_3 0.04, CaO 0.09, Li_2O 6.35, Na_2O 1.68, K_2O 0.21, Rb_2O nil, Cs_2O nil, $\text{H}_2\text{O} + 0.17 = 100.29$; sp. gr. 3.140. Manganapatite is the only phosphate found. The pegmatites of Kluntarna and Varuträsk are referred to different granite intrusions, descriptions of which are given with chemical analyses.

L. J. S.

HOEHNE (Karl). *Über zwei schlesische Vorkommen von Pentlandit*. Chemie der Erde, 1940, vol. 12, pp. 540–548, 1 pl.

Pentlandite occurs, with chalcopyrite, pyrite, chalybite, scolecite, &c., in an amphibolite on the Krebsberg, Boberröhrsdorf, Hirschberg, Silesia. Previous records of pentlandite from Silesia could not be confirmed except for an occurrence at Michelsdorf, Schweidnitz.

M. H. H.

HOEHNE (Karl). *Über das Vorkommen einiger neuer Antimonminerale in Schlesien*. Chemie der Erde, 1940, vol. 13, pp. 44–49.

At the mine Evelinensglück, Rothenzechau, Landeshut, Silesia, the ore varies from stibnite to berthierite, and includes small amounts of native antimony. Other occurrences of antimony minerals in Silesia are reviewed.

M. H. H.

MEIXNER (Heinz). *Einige neue Mineralfunde (Dumortierit, Skapolith) aus dem Koralpengebiete, Steiermark bzw. Kärnten*. Zentralbl. Min., Abt. A, 1940, pp. 19–24.

Minute blue specks in scapolite from Schwanberg, Styria, were identified as dumortierite. Scapolite occurs with tremolite, &c., in marble at Waldenstein, Carinthia.

L. J. S.

PARKER (R. L.), QUERVAN (F. de), & WEBER (F). *Über einige neue und seltene Mineralien der Schweizeralpen*. Schweiz. Min. Petr. Mitt., 1939 [i.e. 1940], vol. 19 (for 1939), pp. 293–306, 1 pl.

Minute, bright blue crystals as bundles of hexagonal prisms, previously mistaken for beryl or tourmaline, are found very sparingly at Weitenalpkehle in Etzlithal and two other places near the border of the Aar granite massif. They have ω 1.622, ϵ 1.606, intense pleochroism, ω almost colourless, ϵ sky-blue, sp. gr. 2.775, and are identified as bazzite [M.A. 1–204], but no chemical test was made for scandium. Wax-yellow rhombohedral crystals from Val Nalps have ω 1.649, $\epsilon > 1.74$, and from their X-ray pattern are identified as synchysite rather than parisite. A pegmatite mineral from Valle della Madonna, near Brissago in Tessin, gave on analysis by J. Jakob P_2O_5 40.81, Al_2O_3 2.60, FeO 32.58, MnO 15.65, CaO 7.95, MgO 0.53, H_2O trace = 100.12, sp. gr. 3.71, α 1.705, β 1.708, γ 1.722, $2V$ 43° ; data agreeing with those of graftonite and also repossite [M.A. 6–52, 7–395]. A white encrustation on the walls of an abandoned asbestos mine in serpentine at Alpe Quadrada near Poschiavo gave α 1.413, β 1.502, γ 1.525, is identified as nesquehonite, but it may perhaps be hydromagnesite or artinite. Other minerals of sparing occurrence described are datolite, orthite, wulfenite, scheelite, vivianite, and columbite. L. J. S.

GÜBELIN (E.). *Die Mineralien im Dolomit von Campolungo (Tessin)*. Schweiz. Min. Petr. Mitt., 1939 [i.e. 1940], vol. 19 (for 1939), pp. 325–442, 4 pls., 27 text-figs.

A dissertation on the crystalline dolomite banded with schist and quartzite at Campolungo. Detailed descriptions are given of 22 mineral species, with crystallographic and optical data for corundum, diaspore, dolomite, orthoclase, pyrite, quartz, scapolite, tremolite, tourmaline, &c., and several chemical analyses. Green tourmaline (sp. gr. 3.0534, ' ω ' 1.6074, ' ϵ ' 1.6273 (Na); analysis by J. Jakob [M.A. 7–217]) gave an X-ray value a 15.96 Å. and (from the goniometric value c/a 0.447) c 7.14 Å. The unit cell contains three molecules $(Ca,K,Na)_{1.74}(Si,B)_9(Al,Fe,Ti,Mg,Mn)_9O_{30}H_{1.37}$, a formula differing slightly from that of Machatschki [M.A. 4–204]. A comparison is made with the similar occurrences in crystalline dolomite at Binn; at Campolungo the only sulphide minerals are pyrite and fahlerz. L. J. S.

WEBER (Fr.). *Mehrfarbiger Fluorit als Kluftmineral im Gotthardmassiv*. Schweiz. Min. Petr. Mitt., 1939 [i.e. 1940], vol. 19 (for 1939), pp. 443-448.

Fluorite has long been known from veins of the Alpine type in the Aar massif (between Grimsel and Fellithal), and it is of still more sparing occurrence in the Pennine Alps; but in the St. Gotthard massif, lying between these two districts, it has been supposed to be absent. Recent finds have been made in Val Nalps, as large octahedra (2 kg.), pink inside and green outside.

L. J. S.

FIorentino (Anna). *Contributo alla mineralogia dell' Isola dei Ciclopi*. Boll. Accad. Gioenia Sci. Nat. Catania, 1936, ser. 3, fasc. 2, pp. 26-31.

The crystal-forms shown by diopside, garnet, calcite, and aragonite from the Cyclopean Isles, Sicily, are noted. Mention is also made of pyrrhotine, pyrite, and chalcopyrite.

L. J. S.

[GODABRELIDZE (S. A.). Годабрелидзе (С. А.). Минеральные ресурсы ССР Грузии. [*Mineral resources of Georgia*.] Tiflis, 1933, xxiv + 1136 + 6 pp. Maps, pls., and figs. Price 30 rub. (bound 35 rub.).

This large volume written in Russian by ten authors with S. A. Godabrelidze as editor gives detailed accounts of the several economic minerals occurring in Georgia (= Gruzia). The long table of contents is in Russian, Georgian, and French, and there is a copious geographical index.

L. J. S.

BLAKE (G. S.) [1876-1940]. *Report on geology, soils and minerals and hydro-geological correlations*. In: IONIDES (M. G.). Report on the water resources of Transjordan and their development. London (Crown Agents), 1939, pp. 43-127, geol. map (1 : 1,000,000), 59 figs.

This gives an outline of the geology and mineral resources of Transjordan, and is an extension of the 1930 report [M.A. 4-311]. Mention is made of ores of Fe, Cu, and Mn, ochre, phosphates, gypsum, bituminous limestone, petroleum, and building stones, but none of especial importance.

L. J. S.

HARRIS (H. G.) & WILLBOURN (E. S.). *Mining in Malaya*. Revised by MACDONALD (A. G.) & WILLBOURN (E. S.). 1940. London (Malaya House), 108 pp., many figs. Gratis.

This edition has been considerably altered and somewhat enlarged since those of 1931 and 1936. It gives details of the methods of mining, more especially of tin ore in alluvial and lode deposits. In addition to the important tin ore, gold, bauxite, coal, ores of tungsten (wolframite and scheelite), iron (haematite and magnetite), and manganese have also been worked. Ilmenite, zircon, and monazite are present in the 'amang' of the tin concentrates. Deposits of arsenopyrite and fluorite are available. Statistics are given up to 1938. L. J. S.

BOERICKE (William F.) & LIM (Nestorio N.). *The mineral resources of the Philippines for the years 1934-1938. Part I—Gold mines*. Techn. Bull. Dept. Agric. & Commerce, Manila, 1939, no. 13, 136 pp., 10 figs.

——— *et alii. Part II—Base metals and nonmetallics*. Ibid., 1940, no. 13, 156 pp., 9 figs.

The previous report for the period 1926-33 was issued in 1936. Since then there has been a very considerable increase in production, amounting in the case of gold to 472 %, and the country now ranks sixth amongst the gold-producing countries of the world—South Africa, Canada, United States, Australia, Mexico, Philippines. Of the 32 mines described in detail 22 are in lodes, the most productive being near Baguio in Mountain province, Luzon. The production of ores of Fe, Cu, Mn, and Cr also shows an increase. Useful maps show the distribution of the mineral deposits. L. J. S.

TYNDALE-BISCOE (R.). *Geological report on the Norton gold belt*. Short Rep. Geol. Surv. Southern Rhodesia, 1940, no. 31, 10 pp., 1 map.

Located about 30° 45' E. and 18° 0' S., the belt forms a lenticular outcrop of Basement Schists, 21 × 5 miles in area, in granite. A brief description is given of 14 gold mines. E. D. M.

AMM (F. L.). *The geology of the country around Bulawayo*. Bull. Geol. Surv. Southern Rhodesia, 1940, no. 35, 307 pp., 25 pls., 2 maps. Price 9s. 9d.

The area mapped, with Bulawayo a little north of the centre, covers 1200 sq. miles and lies just south of the area described in Bulletin no. 30

[M.A. 7-432]. The greater part of the area consists of Basement Schists which comprise the older Volcanic Greenstone series and the younger Sedimentary series. They form the southern end of the Bulawayo gold belt and are bounded to the east, south, and west by invading granite. Three types of granite are distinguished and structural features of part of them are mapped separately. Other intrusions include syenite, felsite, quartz-prophyry, and dolerite. Karroo and Kalahari systems occupy very subordinate areas and their floors have been contoured. 514 gold mines are described, mostly quartz-veins and impregnations or replacement lodes, and are found in the schists and older granites. Brief reference is also made to the occurrence of asbestos, copper, iron, limestone, pyrite, tungsten, and vanadium. E. D. M.

TYNDALE-BISCOE (R.). *The geology of the country around Gwanda*. Bull. Geol. Surv. Southern Rhodesia, 1940, no. 36, 204 pp., 14 pls., 14 text-figs., 1 map. Price 6s. 6d.

The area is 48×32 miles in size and situated about 60 miles SSE. of Bulawayo. The description includes material already published [M.A. 7-155, 451]. Basement Schists which occupy an irregular patch about the centre of the area, comprise the Greenstone group which is associated with members of the Quartz-schist group and which, after invasion by ultrabasic intrusions, was followed by the Greywacke group. They are practically surrounded by granites which include adamellite and monzonite, six analyses of which are quoted. Special structural maps of both schist and granite are given. Finally, dolerite dikes of different types occur, but no subsequent sediments. Noteworthy are the lenticular limestone deposits in the greenstones, which are regarded as replacement deposits due to magmatic carbonates. Reference is made to some 200 gold mines and several are described. Mention is also made of the occurrence of arsenic, asbestos, copper, ironstone, limestone, magnesite, pyrite, scheelite, and silver. E. D. M.

WARREN (Harry V.) & DAVID (Philip). *Some bismuth minerals from British Columbia*. Univ. Toronto Studies, Geol. Ser., 1940, no. 44, pp. 107-111.

At Glacier Gulch, Hudson Bay Mountain, near Smithers, the following minerals occur in quartz: bismuthinite (sp. gr. 6.77) as poorly-formed prisms up to 1 inch; joseite (sp. gr. near 8.0) as cleavable platy masses; a mineral like joseite (average sp. gr. 8.6?) with the composition

Bi_4TeS_2 , indicated by an analysis, Bi 79.3, Te 12.2, S 6.0, Se none, Au trace, insol. trace = 97.5, by F. A. Forward; electrum (Au 85.72, Ag 14.28). Galenobismutite with intergrown fibrous cosalite occurs at the Cariboo gold quartz mine, Wells, Cariboo district [M.A. 7-509]. Tellurbismuth (sp. gr. 7.82, 7.80), identical with artificial Bi_2Te_3 , is found as plates up to $\frac{1}{2}$ inch with gold in pyrite and quartz at the Hunter group claims, Khutze inlet, Swanson bay, and at the Ashloo mine, near Squamish, Howe sound. M. A. P.

ZODAC (Peter). *Atlas quarry near Pine Island, N.Y.* Rocks and Minerals, Peekskill, N.Y., 1940, vol. 15, pp. 162-164, 1 fig. (map).

A description of the Atlas quarry in Orange County, with a list of the 28 species and varieties of minerals found there. The rock is a white crystalline limestone penetrated by igneous dikes. J. M. S.

ZODAC (Peter). *Shaft 7 near Fishkill, N.Y.* Rocks and Minerals, Peekskill, N.Y., 1941, vol. 16, pp. 3-11, 3 figs. (maps).

During the construction of the Delaware aqueduct from Lackawack dam on the Rondout Creek in Ulster County, New York, to New York city, 31 shafts have been sunk. The most interesting of these is shaft 7 near Fishkill and an account is given of the geology of the rocks encountered, together with a list of 39 species and varieties of minerals found there. J. M. S.

TRAINER (John N.). *The fifth year at Tilly Foster.* Rocks and Minerals, Peekskill, N.Y., 1941, vol. 16, pp. 122-126, 3 figs.

One species (baryte), one variety (amphibole-asbestos), and two pseudomorphs new to the locality have been added to the previously published lists of minerals from the Tilly Foster mine, Brewster, New York [M.A. 7-550]. Notes are given on other specimens collected from the same place during the year. J. M. S.

VERROW (Harold J.). *New Hampshire minerals.* The Mineralogist, Portland, Oregon, 1939, vol. 7, pp. 441-442.

A list of 45 minerals found by the writer in Coos Co., White Mountains, New Hampshire. J. M. S.

VERROW (Harold J.). *New Hampshire pegmatites productive.* The Mineralogist, Portland, Oregon, 1940, vol. 8, pp. 329-330.

A short description of a visit to a disused mine at North Groton,

New Hampshire, where amongst other specimens was found a decomposition product of triphylite, which may prove to be a new species. The optics were provisionally determined: α 1.787, β (parallel to fibres) 1.813, biaxial positive, $2V$ 85° ; pleochroism α bright green, β reddish-brown.

J. M. S.

VERROW (Harold J.). *Minerals from Newry mine*. The Mineralogist, Portland, Oregon, 1940, vol. 8, p. 51.

A short list of 22 minerals obtained by the writer from Newry mine, Newry, Maine.

J. M. S.

KING (J. B.). *Occurrence of wulfenite in Arizona*. The Mineralogist, Portland, Oregon, 1940, vol. 8, pp. 261–262, 1 fig.

A description of the occurrence of fine wulfenite specimens at the Hilltop lead mine, in the Chiricahua Mountains, 70 miles north of Douglas, Arizona.

J. M. S.

GOLDRING (E. D.). *Aragonite crystals from Wyoming*. The Mineralogist, Portland, Oregon, 1941, vol. 9, pp. 16, 18, 1 fig.

A description of single and interpenetrating pseudo-hexagonal crystals of aragonite from two localities in Big Horn Co., Wyoming.

J. M. S.

PEARL (Richard M.). *Minerals near Turret, Colorado*. The Mineralogist, Portland, Oregon, 1941, vol. 9, pp. 45–46, 1 fig.

A short description of minerals (sapphire, garnet, epidote, quartz) to be found in the old Calumet iron mine, Chaffee County, Colorado.

J. M. S.

La colección mineralógica de Raimondi. Bol. Museo Hist. Nat. Lima, 1939, año 3, no. 9, pp. 14–27; no. 10, pp. 17–26; no. 11, pp. 3–15; 1940, año 4, no. 12, pp. 29–41; no. 13, pp. 168–184.

Descriptions of individual specimens of Peruvian minerals, arranged geographically under departments, of still another collection of A. Raimondi (1826–1890). [M.A. 7–502.]

L. J. S.

MAWSON (Douglas). *Record of minerals of King George Land, Adelie Land and Queen Mary Land*. Australasian Antarctic Expedition 1911–1914, Ser. A, 1940, vol. 4 (Geology), pt. 12, pp. 369–403. Price 4s.

— *Catalogue of rocks and minerals collected in Antarctic regions*. Ibid., pt. 13, pp. 405–429. Price 3s.

The minerals are mostly rock-forming minerals occurring as constituents of the igneous, sedimentary, and metamorphic rocks described in previous reports of this series. Chemical analyses are given of feldspars (3), pyroxenes (2), and cordierite. Larger crystals of epidote, tourmaline, and apatite were found. Less common species are lawsonite, dumortierite, and kornerupine. Analysis of deposit from penguin rookeries shows much magnesium phosphate, suggesting newberyite. Mirabilite as encrustations on rocks is derived from sea spray at low temperatures.

Part 13 is a list in numerical order of 1400 specimens giving names, localities, and references to previous reports. L. J. S.

Artificial Minerals.

SMITH (F. Gordon). *Solution and precipitation of lead and zinc sulphides in sodium sulphide solutions*. Econ. Geol., 1940, vol. 35, pp. 646–658, 24 figs.

Various charges of sodium polysulphide and sodium hydrogen sulphide with PbCl_2 and ZnCl_2 were heated in a graphite-lined bomb to 410–425° C. in 2–3 hours and cooled to 25–30° in 18–20 hours. A microscopic examination of the resulting crystals of blende, galena, and wurtzite, showed that PbS and ZnS are slightly soluble in the solutions used and that blende was deposited before galena, as in nature.

M. A. P.

BILTZ (Wilhelm) & WIECHMANN (Friedel). *Zum System Mangan/Schwefel: Abbau und Synthese des Hauerits (MnS_2)*. Zeits. Anorg. Chem., 1936, vol. 228, pp. 268–274.

BILTZ (Wilhelm), VOIGT (Adolf), MEISEL (Karl), WEIBKE (Friedrich), & ERLICH (Paul). *Über das System Nickelmonosulfid/Nickel-disulfid/Schwefel*. Ibid., pp. 275–296, 8 figs.

Contrary to the view of C. Doelter (Handb. Min.-chem.), H. de Senarmont's synthesis does yield hauerite. Hauerite is a relatively

unstable sulphide, its dissociation pressure exceeding the vapour pressure of liquid sulphur at $\geq 300^\circ \text{C.}$; it does not take up excess sulphur nor form mixed crystals or compounds with MnS . No lower sulphide than MnS exists. NiS_2 takes up considerable amounts of excess sulphur, as also does NiS (up to $\text{NiS}_{1.2}$; metal defect lattice). No compounds intermediate between NiS and NiS_2 exist, but there are two lower sulphides, Ni_6S_5 and Ni_3S_2 . Analyses of natural minerals are given: hauerite, Raddusa, Sicily, Mn 46.58, S 53.54, also Mn 46.45, S 53.61, and Mn 46.08, Fe 0.05, S 53.82; millerite, Gass mine, Pennsylvania, Ni 64.19, Fe 0.59, S 35.17; millerite, Viktoria mine, Littfeld, Westphalia, Ni 64.00, S 35.99. Pure NiS has a 3.43, c 5.34 Å.; the values a 3.42, c 5.30 Å. refer to $\text{NiS}_{1.2}$. M. H. H.

BILTZ (Wilhelm) & HEIMBRECHT (Max). *Über die Phosphide des Nickels*. Zeits. Anorg. Chem., 1938, vol. 237, pp. 132–144, 3 figs.

The existence of the compounds NiP_3 , NiP_2 , Ni_6P_5 , and Ni_2P was demonstrated by tensimetric analysis and X-ray study, their densities determined, and their heats of formation deduced. The existence of Ni_5P_2 and Ni_3P is accepted. M. H. H.

MICHEL-LÉVY (Albert) & WYART (Jean). *Naissance de la cristobalite et du quartz par recuit de silice vitreuse sous haute pression, à l'aide d'explosifs*. Compt. Rend. Acad. Sci. Paris, 1940, vol. 210, pp. 733–734.

Further similar experiments [M.A. 7-472] show that if the vitreous silica is detonated with H_2O and KOH in a silver tube, the subsequent heating being for 4–13 days at 440 – 700° , quartz is formed; with H_2O alone only glass was produced at 515° , but a cristobalite pumice at 545° and 610° . If the tube was of copper, with only H_2O quartz is obtained at 450 – 650° , but at 720 – 730° cristobalite pumice; addition of a considerable amount of KOH gave quartz, but if only 1 % was added cristobalite resulted. C. A. S.

TOROPOV (N. A.) & STUKALOVA (M. M.). Торопов (Н. А.) и Стукалова (М. М.). *Interchange of bases in crystals of beta-alumina*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1939, vol. 24, pp. 459–461.

In the system $\text{BaO-Al}_2\text{O}_3$ a barium aluminate $\text{BaO} \cdot 0.6\text{Al}_2\text{O}_3$ (d 3.63, ω 1.702, ϵ 1.694) was obtained which shows structural relations to 'β-alumina' ($\text{Na}_2\text{O} \cdot 12\text{Al}_2\text{O}_3$) [M.A. 7-86]. When this is fused with alkali carbonates there results $\text{Na}_2\text{O} \cdot 0.6\text{Al}_2\text{O}_3$ (d 3.33, ω 1.686, ϵ 1.650), $\text{K}_2\text{O} \cdot 0.6\text{Al}_2\text{O}_3$ (ω 1.696, ϵ 1.660), and $\text{Rb}_2\text{O} \cdot 0.6\text{Al}_2\text{O}_3$. L. J. S.

WELO (Lars A.) & BAUDISCH (Oskar). *Some evidence for the existence of higher hydrates of ferric oxide as transition intermediates*. Phil. Mag., 1941, ser. 7, vol. 31, pp. 103-114, 3 figs.

The conversion of ferromagnetic $\gamma\text{-Fe}_2\text{O}_3$ to a non-ferromagnetic isomer by heating at various temperatures up to 71.3°C . in sealed tubes with water is followed by measurement of the magnetic susceptibility of the sample. The conversion rates can be grouped into four distinct series which imply the formation of hydrates as transformation intermediates. Possible hydrates not yet isolated include $\gamma\text{-Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$, corresponding to gibbsite, and $\beta\text{-Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$, whilst the formation of $\beta\text{-Fe}_2\text{O}_3$ may occur in the conversion γ - to $\alpha\text{-Fe}_2\text{O}_3$. F. A. B.

PRESTON (G. D.). *Zinc oxide smoke*. Nature, London, 1941, vol. 147, p. 298, 1 fig.

A photograph taken with the electron microscope of zinc oxide formed by burning zinc in air shows acicular crystals 4500 \AA . long and 450 \AA . thick. L. J. S.

DAVIDSON (H. R.). *Geometrical crystallography of PbO_2 and Pb_5O_8* . Amer. Min., 1941, vol. 26, pp. 18-24, 6 figs.

Crystals of PbO_2 (artificial plattnerite) and Pb_5O_8 large enough for goniometric measurement were prepared by heating a mixture of lead peroxide, sodium hydroxide, and water in a steel bomb. Tetragonal PbO_2 was produced as acicular crystals with minute pyramids; forms, (101), (111), (211), and (230), sometimes twinned on (101), axial ratio $c 0.6785$. Four types of tetragonal Pb_5O_8 crystals are described including mimetic hexagonal twins on (101); forms, (001), (111), (100), and (110), axial ratio $c 0.989$. X-ray powder photographs of both compounds are reproduced. F. A. B.

HÜTTIG (G. F.), ZÖRNER (A.), & HNEVKOVSKY (O.). *Die Darstellung von neutralem Zinkcarbonat ZnCO_3* . Sitzungsber. Akad. Wiss. Wien, Math.-Naturwiss. Kl., 1938, vol. 147, Abt. II b, pp. 107-117.

Smithsonite has been successfully synthesized by precipitating ZnSO_4 with KHCO_3 in aqueous solution and digesting several days at a low temperature ($< 10^\circ\text{C}$.), then drying under 10 atmos. CO_2 pressure at 130°C .; or by sealing a mixture of ZnCl_2 , KHCO_3 , solid CO_2 , and a little water in a glass tube and heating 2 hours at 125°C . The identity of the product was checked by X-ray powder photographs. Two prepara-

tions of basic zinc carbonate with compositions near $5\text{ZnO} \cdot 2\text{CO}_2 \cdot 4\text{H}_2\text{O}$ gave X-ray powder photographs showing none of the lines of ZnCO_3 or of ZnO . M. H. H.

KLEMENT (Robert). *Basische Phosphate zweiwertiger Metalle. II. Blei-Hydroxylapatit*. Zeits. Anorg. Chem., 1938, vol. 237, pp. 161–171, 1 fig. [M.A. 7–494.]

The conditions of formation of the apatite-type compound $\text{Pb}_{10}(\text{PO}_4)_6(\text{OH})_2$ have been determined, as also those of $\text{Pb}_3(\text{PO}_4)_2$, which is dimorphous (monoclinic and orthorhombic). The " $\text{Pb}_3(\text{PO}_4)_2$ " of apatite-type structure of F. Zambonini and A. Ferrari [M.A. 5–320] was really $\text{Pb}_{10}(\text{PO}_4)_6(\text{OH})_2$, and is stable in moist air at 950°C . $\text{Pb}_{10}(\text{PO}_4)_6(\text{OH})_2$ has a 9.90, c 7.29 Å., sp. gr. 7.11–7.12. Lead is largely found in the bones after lead poisoning, evidently in isomorphous admixture in hydroxyapatite. M. H. H.

KLEMENT (R.) & DIHN (P.). *Basische Phosphate zweiwertiger Metalle. III. Barium-Hydroxylapatit*. Zeits. Anorg. Chem., 1938, vol. 240, pp. 31–39, 1 fig.

The apatite-type compound $\text{Sr}_{10}(\text{PO}_4)_6(\text{OH})_2$ [M.A. 7–494] is readily prepared by hydrolysis of SrHPO_4 , or by ignition of a suitable mixture of $\text{Sr}_3(\text{PO}_4)_2$ and SrCO_3 in moist air at 1150°C . $\text{Ba}_{10}(\text{PO}_4)_6(\text{OH})_2$, on the other hand, can only be prepared by the second method (but using BaO_2 rather than BaCO_3), as in contrast to the Ca, Sr, and Pb compounds $\text{Ba}_3(\text{PO}_4)_2$ is stable to hydrolysis, and with alkali gives $\text{BaNaPO}_4 \cdot 10\text{H}_2\text{O}$. The barium- and strontium-wagnerites Ba_2 - and $\text{Sr}_2(\text{PO}_4)(\text{OH})$ of C. von Woyczynski (1894) could not be obtained. M. H. H.

NIKOLAEV (A. V.) & ČELIŠČEVA (A. G.) [CHELISHCHEVA (A. G.)]. *Über die Synthese von Inyoit*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1938, new ser., vol. 18, pp. 431–432, 1 fig.

One of a series of $\text{CaO}-\text{B}_2\text{O}_3-\text{H}_2\text{O}$ mixtures [M.A. 7–476], after standing 5 months, deposited inyoite (α 1.491, β 1.518, γ 1.505); the mother liquor contained 1.13 % B_2O_3 , 0.067 % CaO . M. H. H.

CHELISHCHEVA (A. G.) ЧЕЛИЩЕВА (А. Г.). *Heating curves and specific weights of synthetic borates*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 28, pp. 508–511, 4 figs.

Inyoite ($2\text{CaO} \cdot 3\text{B}_2\text{O}_3 \cdot 13\text{H}_2\text{O}$) and inderite ($2\text{MgO} \cdot 3\text{B}_2\text{O}_3 \cdot 15\text{H}_2\text{O}$) both

artificial and natural from Inder show the same heating curve, with an endothermal effect due to loss of water up to 450° and an exothermal effect (150°) on change to the solid state at 740° . Sp. gr. of inyoite 1.87 (artificial), 1.88 (natural); of inderite 1.78 (artificial), 1.79 (natural).

L. J. S.

MENZEL (Heinrich), SCHULZ (H.), & DECKERT (H.). *Bildungs- und Existenzbedingungen des Kernits $\text{Na}_2\text{B}_4\text{O}_7 \cdot 4\text{H}_2\text{O}$* . Naturwiss., 1935, vol. 23, pp. 832–833, 1 fig.

MENZEL (Heinrich) & SCHULZ (Hans) [†1939]. *Zur Kenntnis der Borsäuren und borsäuren Alkalisalze. X. Der Kernit (Rasorit) $\text{Na}_2\text{B}_4\text{O}_7 \cdot 4\text{H}_2\text{O}$* . Zeits. Anorg. Chem., 1940, vol. 245, pp. 157–220, 39 figs.

After many unsuccessful attempts kernite [M.A. 3–271, 4–245] was prepared as small (2 mm.) crystals by heating $\text{Na}_2\text{B}_4\text{O}_7$ with 4.5–6 mols. H_2O in a closed tube at 130 – 135° for 20 hours. Larger (6 mm.) crystals were then obtained by further growth on the smaller crystals in a concentrated solution of $\text{Na}_2\text{B}_4\text{O}_7$ in a closed tube within the temperature range of stability of kernite. Goniometric measurement of these crystals gave $a : b : c = 1.5112 : 1 : 1.6875$, with 19 crystal-forms, 12 of which are new. At 100 – 120° kernite passes to a crystalline dihydrate (meta-kernite), and in a moist atmosphere it yields the decahydrate, but these changes are not reversible. The normal and reversible course of dehydration in the system $\text{Na}_2\text{B}_4\text{O}_7$ – H_2O is through the 10, 5, 2 (amorphous), and 1 hydrates. The Na-Ca hydrous borates, probertite [M.A. 4–245], ulexite, and pandermite, were also prepared artificially.

L. J. S.

[GRIGORIEV (D. P.) & GELMONT (A. Y.)] Григорьев (Д. П.) и Гельмонт (А. Я.). Гравитационно-кристаллизационная дифференциация в силикатном расплаве с летучими компонентами.—GRIGORIEV (D. P.) and GELMONT (A. J.). *Gravitative differentiation in the silicate melts with volatiles*. Изв. Акад. Наук СССР, Сер. Геол. (Bull. Acad. Sci. URSS, Sér. Géol.), 1939, no. 4, pp. 194–196. (Russian with English summary.)

A melt composed of SiO_2 35.1, Al_2O_3 13.6, CaF_2 4.1, MgO 26.1, K_2CO_3 11.1, NH_4F 10.0, on cooling showed 10 % spinel and 90 % mica in the upper part of the crucible and 28 % spinel and 72 % mica in the lower part.

S. I. T.

[GRIGORIEV (D. P.)] Григорьев (Д. П.). О взаимоотношениях полевошпатово-пироксенового и сульфидного расплавов.—GRIGORIEV (D. P.). *On the interrelations of feldspar-pyroxene and sulphide melts*. Зап. Всеросс. Мин. Общ. (Mém. Soc. Russe Min.), 1938, ser. 2, vol. 67, pp. 7–17, 2 pls., 2 text-figs. (Russian with English summary.)

Experiments of melting mixtures of oxides corresponding to mixtures of felspar and pyroxene with iron sulphide demonstrate the liquid immiscibility of silicate and sulphide melts. S. I. T.

AKIYAMA (Kei-ichi). *Synthesis and X-ray analysis of gehlenite and anorthite*. Journ. Soc. Chem. Indust. Japan, Suppl., 1940, vol. 43, p. 341 B.

Mixtures of CaO , Al_2O_3 , and SiO_2 in the required proportions were heated at 1450°C . Measurements of the X-ray patterns are given.

L. J. S.

JANDER (Wilhelm) & WUHRER (Josef). *Hydrothermale Reaktionen. I. Die Bildung von Magnesiumhydrosilikaten*. Zeits. Anorg. Chem., 1938, vol. 235, pp. 273–294, 9 figs.

By interaction of MgO and silica gel in presence of water under pressure at 325 or 350°C . talc and serpentine were obtained. Synthetic Mg_2SiO_4 and MgSiO_3 , and natural olivine, enstatite, and bronzite were also heated with water or with weak acid or alkali under pressure and at 350°C . gave serpentine and talc. The course of the reactions is considered in detail.

M. H. H.

CLARK (L. M.) & BUNN (C. W.). *The scaling of boilers. Part IV. Identification of phases in calcium silicate scales*. Journ. Soc. Chem. Ind. London, 1940, vol. 59, pp. 155–158, 1 fig.

X-ray and optical examination of six highly siliceous boiler scales reveals the presence of xonotlite in four and pectolite in two of them. Chemical analyses and powder photograph data are given for okenite, pectolite, riversideite, xonotlite, afwillite, and hillebrandite from known localities. Details are given of the syntheses of xonotlite, pectolite, and hillebrandite, and powder data are tabulated for the first two, differing slightly from those of the corresponding naturally occurring minerals. These and the small differences observed in the powder data of a boiler scale and its chief mineral constituent are attributed to differences in chemical composition.

F. A. B.

Chemical Crystallography.

GRIMM (H. G.), PETERS (Cl.), & WOLFF (H.). *Über neuartige Mischkristalle. IV.* Zeits. Anorg. Chem., 1938, vol. 236, pp. 57-77, 10 figs.

The conditions under which mixed crystals of BaSO_4 with KMnO_4 , AmMnO_4 , NaMnO_4 , LiMnO_4 , $\text{Ba}(\text{MnO}_4)_2$, BaMnO_4 , BaFeO_4 , and BaSeO_4 can be obtained have been studied. BaSO_4 does not form mixed crystals with BaTeO_4 , AgMnO_4 , or CsMnO_4 . KMnO_4 forms mixed crystals with KBF_4 , KHSO_4 , BaSeO_4 , BaCrO_4 , but not with SrSO_4 or SrCrO_4 . M. H. H.

ZINTL (E.) & MORAWIETZ (W.). *Über die Mischkristalle des Kryoliths mit Tonerde.* Zeits. Anorg. Chem., 1939, vol. 240, pp. 145-149.

The existence of mixed crystals of Na_3AlF_6 containing up to about 11 % of Al_2O_3 is confirmed. X-ray and density data show that the substitution must be formulated $(\text{Na},\text{Al})_3\text{Al}(\text{F},\text{O})_6$. Mechanical mixture and alternative structures are excluded. The density and unit cell-size are not appreciably altered. M. H. H.

ZINTL (E.) & UDGÅRD (A.). *Über die Mischkristallbildung zwischen einigen salzartigen Fluoriden von verschiedenem Formeltypus.* Zeits. Anorg. Chem., 1939, vol. 240, pp. 150-156.

ZINTL (E.) & CROATTO (U.). *Fluoritgitter mit leeren Anionenplätzen.* Ibid., 1939, vol. 242, pp. 79-86, 3 figs.

The supposed mixed crystal formation from LiF and MgF_2 could not be confirmed, and LiF cannot take up more than 5 % MgF_2 at most. X-ray and density determinations show that in CaF_2 - YtF_3 mixed crystals (yttrofluorite), the extra F' is accommodated interstitially, $(\text{Ca},\text{Yt})\text{F}_{2-3}$, and this is confirmed by comparison of calculated and observed X-ray diffraction intensities. SrF_2 - YtF_3 and CaF_2 - ThF_4 mixed crystals are also of interstitial type; CaF_2 can take up about 24 % ThF_4 . CeO_2 can take up approximately 44 mol. % of La_2O_3 in isomorphous admixture, with an increase in cell-size from 5.396 to 5.588 Å., and leaving vacant places in the oxygen positions, as is shown by density determinations. [No chemical analyses were made, so it is not proved that the material was not $(\text{Ce},\text{La})\text{O}_2$.] M. H. H.

JANDER (Wilhelm) & KRIEGER (Alfred). *Die Gleichgewichte $\text{Fe} + \text{CoO} \rightleftharpoons \text{Co} + \text{FeO}$ und $\text{Ni} + \text{CoO} \rightleftharpoons \text{Co} + \text{NiO}$ im Schmelzfluß.* [V. Mitteilung über Gleichgewichte zwischen Metallen, Sulfiden und Silikaten im Schmelzfluß]. Zeits. Anorg. Chem., 1937, vol. 232, pp. 39-56, 11 figs.

The equilibria $\text{Fe} + \text{CoO} \rightleftharpoons \text{Co} + \text{FeO}$ and $\text{Ni} + \text{CoO} \rightleftharpoons \text{Co} + \text{NiO}$ were studied at 1600-1850° C. alone and in presence of various proportions of SiO_2 . [M.A. 6-100.] M. H. H.

WASASTJERNA (J. A.). *On the structure of solid solutions.* Physical Rev. (Amer. Phys. Soc.), 1939, ser. 2, vol. 55, pp. 986-987.

In an ionic mixed crystal with one common ion, such as $\text{K}(\text{Cl}, \text{Br})$, differences in the interionic forces according to which ion occupies a given position should cause a displacement of the ions from their theoretical positions. Experimentally, a displacement in excess of the thermal displacement has been demonstrated. M. H. H.

CORRENS (Carl W.). *Über die Löslichkeit von Kieselsäure in schwach sauren und alkalischen Lösungen.* Chemie der Erde, 1940, vol. 13, pp. 92-96, 1 fig.

The solubility of silica in dilute sulphuric acid and ammonia has been investigated, using a silica gel as solid and determining only the silica which will pass through a 'fine' ultrafilter, and which is believed to be in true solution. The solubility varies markedly with acidity and is a minimum at pH 3. The colorimetric method of determining silica is not reliable except for solutions weak enough to remain in true solution at pH 3. M. H. H.

BARONI (A.). *Polimorfismo ed isomorfismo dei solfuri e seleniuri di Ni, Co, Cd, Hg.* Atti X Congr. Internaz. Chim., Roma, 1938, vol. 2, pp. 586-592.

Electron diffraction measurements show that CoS and CoSe are of three forms: α amorphous; β hexagonal of the pyrrhotine type; γ rhombohedral of the millerite type. Each of these forms mixed crystals with the corresponding forms of NiS and NiSe [M.A. 6-328]. HgSe has cubic (zinc-blende type) and hexagonal (cinnabar type) forms. The cubic forms of CdS and CdSe form mixed crystals with HgS and HgSe .

L. J. S.

NÁRAY-SZABÓ (István) & SASVÁRI (Kálmán). *A nádcukor ú. n. A és B módosulatainak röntgenográfiai vizsgálata.*—NÁRAY-SZABÓ (St. v.) und SASVÁRI (K.). *Über die sog. A- und B-Modifikationen des Rohrzuckers.* Mat. Term.-tud. Értesítő, Budapest, 1939, vol. 58, pp. 716–720 (Hungarian), p. 721 (German summary).

Piezoelectric tests, X-ray examination, and specific gravity determinations show no difference between the supposed *A* and *B* modifications of sucrose (cane-sugar).
V. Z.

Precious Stones.

SHREVE (R. Norris). *Precious and semi-precious jewels—their chemical and beautifying qualities.* Science, New York, 1940, vol. 92, pp. 566–570.

A general account of gemstones in the groups of elements, oxides, silicates, &c.
L. J. S.

BALL (Sydney H.). *Geographic distribution of gem stones and some early theories thereon.* Gemmological News: in Watchmaker & Jeweller, Silversmith & Optician, London, May 1941, vol. 67, pp. 241–243.

The adjectives 'oriental' and 'occidental' as applied to gemstones was based on the belief that the better quality stones were generated by the sun's heat; but later they came to be connected merely with the quality of the stone, rather than its source. Geological, rather than geographical, influences are of importance. Turquoise is, however, a stone formed by surface water in a desert climate.
L. J. S.

GRILL (E.). *Determinazione dell' indice di rifrazione nelle gemme.* Atti Soc. Ital. Sci. Nat., Museo Civico, Milano, 1939, vol. 78, pp. 474–484, 3 figs.

The immersion method of determining refractive indices can be applied with a small faceted gemstone placed with the table facet downwards in the liquid. Dark or bright Becke lines are seen on the edges between the facets as the microscope tube is raised or lowered. Tables of values of *d* and *n* are given for various strengths of Thoulet and Clerici solutions and of gemstones.
L. J. S.

ANDERSON (B. W.). *Retractive* [i.e. refractive] *index measurement by Brewster's angle*. *Gemmologist*, London, 1941, vol. 10, pp. 61-63, 3 figs.

Simple apparatus with the use of 'polaroid' measures the angle of maximum polarization of light reflected from the facet of a gemstone, giving $n = \tan \theta$. Approximate values can be obtained by this method.

L. J. S.

BURRAGE (E.). *Polaroid—its properties and its uses in gemmology*. *Gemmologist*, London, 1941, vol. 10, pp. 53-55.

A recapitulation of the properties of 'polaroid' [M.A. 6-461, 7-251] with suggestions for the construction of a simple polariscope and dichroscope, and its use in measuring light absorption and refractive indices (from the angle of polarization of reflected light).

L. J. S.

CHILVERS (Hedley A.). *The story of De Beers*. London (Cassell), 1939, 2nd edit., 1940, xvii+344 pp., many plates. Price 21s.

A general narrative of the discovery and working of diamond in South Africa. The book is very well illustrated with many pictures of the mines at various stages of their development and portraits of persons connected with the industry.

L. J. S.

KRAUS (Edward H.) & SLAWSON (Chester B.). *Cutting of diamond for industrial purposes*. *Amer. Min.*, 1941, vol. 26, pp. 153-160, 5 figs.

The orientation of cutting tools and dies is considered in connexion with directions of different hardness [M.A. 7-519] and of cleavage. For a cutting tool a cylindrical surface is ground with its axis parallel to the longer diagonal of a dodecahedral face (the hardness being greater in this direction than along the shorter diagonal), and the face of the tool is parallel to a second dodecahedral face perpendicular to the first. For wire-drawing dies there will be less chance of breaking along cleavages if the hole is drilled perpendicular to a cube face (on which face also the hardness is least).

L. J. S.

ALEXANDER (A. E.). *Closer inspection of industrial diamonds prior to use advocated*. *Amer. Min.*, 1941, vol. 26, pp. 347-348.

Cutting tools of diamond vary considerably in their life. The material should be examined for flaws and inclusions, and between crossed nicols for optical strain.

L. J. S.

PISHAROTY (P. Rama). *The Young's modulus of diamond*. Proc. Indian Acad. Sci., Sect. A, 1940, vol. 12, pp. 208–211.

Rods of diamond cut with their lengths parallel to an octahedral plane were bent under a load between two knife edges, the amount of bending being measured by an optical method. The Young's modulus in all directions in (111) was found to be 5.5×10^{12} dynes/cm.²

L. J. S.

SHIPLEY (Robert M.). *Famous diamonds of the World*. Los Angeles (Gemological Institute of America), 1939, 62 pp., 40 figs. Price 50 c.

This attractive little pamphlet is a collection, with some modifications and additions, of the series of articles that appeared in 'Gems & Gemology'.

L. J. S.

REIS (Esmaraldo). *Three large Brazilian diamonds*. Gems & Gemology, Los Angeles, California, 1940, vol. 3, pp. 82–84, 3 figs.

Short descriptions are given of the 'Presidente Vargas' diamond [726.60 carats, M.A. 7–331]; the 'Darcy Vargas' diamond (460.00 carats, d_4^{21} 3.517), both from Coromandel, Minas Geraes; and a large mass of carbonado weighing 267.53 carats from Pontesinha, western Rosario district, Cuyaba, Matto Grosso.

J. M. S.

BALL (Sydney H.) & KERR (Paul F.). *The Vargas diamond*. Gems & Gemology, Los Angeles, California, 1941, vol. 3, pp. 135–136.

The 'Presidente Getulio Vargas' diamond of 726.6 carats was found in July 1938 in gravels of the Santo Antonio river, Patrocinio municipality, Bagagem district, Minas Geraes [M.A. 7–331]. It is a flattened and elongated octahedron, $2.8 \times 2.2 \times 0.9$ inches, with a large cleavage surface. Mention is made of other large diamonds from the Bagagem district, including the 'Darcy Vargas' of 455 carats found in 1939.

L. J. S.

GÜBELIN (Edward). *Differences between Burma and Siam rubies*. Gems & Gemology, Los Angeles, California, 1940, vol. 3, pp. 69–72, 5 figs.

Interesting differences may be observed under the microscope between Burmese and Siamese rubies. Those from Burma contain fine, hair-like, oriented rutile needles and curved, pipe-like cavities; while Siamese rubies never contain rutile but enclose swarms of hexagonal cavities or thin, platy crystals lying in parallel planes and associated

with thin meandering canals containing large bubbles, and rows of liquid inclusions also occur. Differences in fluorescence and dichroism are noted and the duller colour of Siamese rubies is thought to be due to the admixture of iron. J. M. S.

GÜBELIN (Edward). *Characteristics of Ceylon rubies*. Gems & Gemology, Los Angeles, California, 1940, vol. 3, pp. 121–124, 7 figs.

Corresponding with the paler colour, the arc spectrum of ruby from Ceylon shows less intense lines of Cr and Fe than ruby from Burma. Enclosures in Ceylon rubies are fine needles of rutile, liquid with bubbles, and, most characteristic, zircon with pleochroic haloes. L. J. S.

ANDERSON (B. W.). *Fancy sapphires*. Gemmologist, London, 1940, vol. 10, pp. 37–39.

Natural and artificial coloured corundums, which 'are often distressingly clean from tell-tale inclusions', can in some cases be distinguished by their absorption spectra, due to differences in the colouring matter. L. J. S.

GÜBELIN (Edward). *Differentiation between Russian and Colombian emeralds*. Gems & Gemology, Los Angeles, California, 1940, vol. 3, pp. 89–92, 6 figs.

Differences in emeralds from Colombia and the Ural Mountains may sometimes be determined by colour filters but the most effective method is by the microscope. Colombian emeralds show liquid inclusions with characteristic tail-like forms and these enclose a gas bubble and a cubic crystal. Specimens from the Urals have liquid inclusions of indeterminate forms whose enclosed crystals are always lozenge-shaped. J. M. S.

CLEMENTS (Thomas). *The emerald mines of Muzo, Colombia, South America*. Gems & Gemology, Los Angeles, California, 1941, vol. 3, pp. 130–134.

The author visited the mines in 1939 when they were not working, a sufficient stock of emeralds being held in reserve. They are not exhausted and the neighbourhood has not been fully exploited. The country-rocks are highly tilted and folded, black carbonaceous limestone and shale of the Villeta formation (Lower Cretaceous). The emerald occurs in calcite veins with quartz, dolomite, and pyrite. No

evidence was found of contact-metamorphism, nor of the granite intrusion postulated by R. Scheibe [M.A. 3-283], and metamorphic lime silicate minerals are not present in the limestone. The veins are probably of low-temperature formation (epithermal or mesothermal zone). [M.A. 1-130.]

L. J. S.

ANDERSON (B. W.). *The three zircons*. Gemmologist, London, 1941, vol. 10, pp. 56-57.

In place of the names meta-zircon [Min. Mag. 25-638], pseudo-zircon [Min. Mag. 25-642], and zirkonoid [M.A. 7-130] it is proposed to call 'low-zircon' [i.e. low-density zircon] simply metamict zircon, while 'high zircon' is normal zircon, and those of intermediate characters are called intermediate zircon. [M.A. 7-131, 522, 523.]

L. J. S.

ANDERSON (B. W.). *Some simple scientific tests for gem stones—XIX. Identification of zircon*. Gemmological News: in Watchmaker & Jeweller, Silversmith & Optician, London, April and May 1941, vol. 67, pp. 197-198, 243, 3 figs.

MORGAN (J. H.) & AUER (Marianna L.). *Optical, spectrographic and radioactivity studies of zircon*. Amer. Journ. Sci., 1941, vol. 239, pp. 305-311.

The zircons examined were mostly microscopic crystals separated from granites, and they are divided into three classes:

			ω .	ϵ .	$\epsilon - \omega$.
(1) Normal type	...	...	1.924-1.934	1.970-1.977	0.036-0.053
(2) Hyacinth type	...	...	1.903-1.927	1.921-1.970	0.017-0.043
(3) Malacon type	...	...	1.782-1.864	1.827-1.872	0.0-0.008

Radioactivity is low in (1), medium in (2), and highest in (3), indicating that the alteration to the metamict state is due to uranium. The character of the zircon thus gives a measure of the amount of uranium present in granite magmas of different intrusions [M.A. 8-22]. Spectrographic analysis showed the presence of Zr, Hf, Yt, Ce, Pb, Fe, Ti, Ge. The ratios Hf : Zr 0.25-0.70 and Yt : Zr 0.21-0.79 show no relation to the radioactivity.

L. J. S.

PEARL (Richard M.). *Colorado turquoise localities*. The Mineralogist, Portland, Oregon, 1941, vol. 9, pp. 3-4, 24-27, 1 fig. (map).

A detailed description of four turquoise localities in Colorado: Hall mine, Villagrove, Saguache Co.; King mine, Manassa, Conejos Co.; Leadville, Lake Co.; and Creede, Mineral Co.

J. M. S.

ANDREWS (G. F.) & WEBSTER (R.). *The specific gravity of odontolite*. Gemmological News: in Watchmaker & Jeweller, Silversmith & Optician, London, December 1940, vol. 66, pp. 757-758.

Different values have been given for the sp. gr. of odontolite ('bone-turquoise', 'fossil ivory'), corresponding with the variable nature of the material. Three cut specimens gave sp. gr. 3.01-3.15, and are assumed to consist of apatite coloured with vivianite (but not further tested). An X-ray photograph by F. A. Bannister of a fragment from Simorre, France, gave the pattern of apatite, which is quite distinct from that of turquoise. L. J. S.

BRANHAM (Allan). *Jade found in Wyoming*. The Mineralogist, Portland, Oregon, 1941, vol. 9, pp. 79-80.

A description of two new finds of nephrite in Wyoming. The first is near Split Rock, Fremont County, where there is also a deposit of gem corundum; the second is near Lander where it occurs associated with agatized wood scattered over the surface of the hills. J. M. S.

FERNQUIST (Charles O.). *The gem minerals of Washington*. The Mineralogist, Portland, Oregon, 1940, vol. 8, pp. 393-396, 437-440.

A list of gem minerals (40 species and varieties) with details of localities in the state of Washington. Varieties of quartz and opal predominate. J. M. S.

DAKE (H. C.). *History of Virgin Valley, Nevada. Largest opal field*. The Mineralogist, Portland, Oregon, 1941, vol. 9, pp. 7-8, 22-24, 1 fig.

An account of the occurrence and history of precious opal in the Virgin Valley. A description is given of the Roebeling black opal, weighing nearly 1 lb., now in the National Museum at Washington. J. M. S.

CORBETT (J. F.). *Amethyst of Thunder Bay*. Rocks and Minerals, Peekskill, N.Y., 1940, vol. 15, pp. 187-189, 1 fig. (map).

A description of the occurrence of amethyst along a diabase dike penetrating diorite (?) in the Thunder Bay district of Ontario. J. M. S.

[FARRINGTON (O. C.) (1864–1933)]. *The coloring of agates. German methods.* The Mineralogist, Portland, Oregon, 1939, vol. 7, pp. 331–332, 345–346.

A translation by the late O. C. Farrington of a paper published in Germany by O. Dreher in 1913. A description with historical notes is given of the methods used in the artificial colouring of agates by the gem-cutters in Idar and Oberstein, Germany. [M.A. 4–71.]

J. M. S.

MYERS (Richmond E.). *The Hardyston jasper of the Reading Hills in Pennsylvania.* Rocks and Minerals, Peekskill, N.Y., 1940, vol. 15, pp. 219–225, 1 fig. (map).

A description of the history and occurrence of the jasper from the Reading Hills district. It is found in association with limonite in the disused iron mines and rival theories of formation are discussed. Detailed instructions for collectors are given.

J. M. S.

ALEXANDER (A. E.). *The rate of seasonal deposition of pearl aragonite.* Science, New York, 1941, vol. 93, pp. 110–111, 1 fig.

The concentric layers, believed to represent annual rings of growth, in a fresh-water pearl showed a thickness of 2.30 mm. for the first year and 0.32–0.46 for the succeeding five years; and a sea pearl 1.60 mm. for the first year and 0.12–0.21 for the succeeding ten years.

L. J. S.

ALEXANDER (A. E.). *The mineralogy of five unusual natural pearls.* Gemmologist, London, 1941, vol. 10, pp. 93–96, 7 figs.

One specimen, a salt-water pearl, consists in the centre of radially arranged calcite, followed by a layer of prismatic aragonite, with laminated aragonite on the outside. A *Mytilus* pearl consists wholly of radially arranged fibrous aragonite, and a *Pinna* pearl of calcite radiating from the centre.

L. J. S.

Colour of Minerals.

LAURENT (Gavonne). *Mineralens luminescensfenomen med särskild hänsyn till kvarts och nefelin från svenska fyndorter.—The luminescence of minerals with special reference to quartz and nepheline from Swedish localities.* Geol. För. Förh. Stockholm, 1941, vol. 63, pp. 59–83. (English summary, pp. 77–82.)

A review is given of the literature with a bibliography of 72 items.

Tarnowitzite, tarbuttite, cerolite, bole, and a number of zeolites are added to the list of fluorescent minerals. Various minerals (calcite, rhodochrosite, rhodonite, &c.) from Swedish and Norwegian localities were examined in ultra-violet light, but with variable results. Quartz in granite-pegmatites from several localities, but not from all, gave a golden-yellow fluorescence (yellow in X-rays) in patches and streaks. After heating to 650° the property is lost. Spectroscopic analysis showed the presence of Yt earths with little La, Ce, Pr, Nd. The luminescence is probably due to these, probably from gadolinite, with which the spectra are compared. Nepheline in the rock canadite from Almunge, Sweden, gave an orange-yellow fluorescence, which is here not due to the presence of sodalite. The rock contains La_2O_3 11, CeO_2 28, Pr_2O_3 5, Nd_2O_3 17, Sm_2O_3 6, Gd_2O_3 4, Dy_2O_3 5 grams per ton.

L. J. S.

GYULAI (Zoltán) & BOROS (János). *Színezett alkálihalogenid kristályok elektromos vezetése egyoldali nyomás alatt.*—GYULAI (Z.) & BOROS (J.). *Die elektrische Leitfähigkeit farbzentrenenthaltender Alkali-halogenid-Kristallen unter einseitigen Druck.* Mat. Term.-tud. Értesítő, Budapest, 1940, vol. 59, pp. 115–124, 2 figs. (Hungarian with German summary.)

The environment of electrons in colour centres (neutral alkali atoms, colloidal alkali particles, or uranium centres) may perhaps be changed by plastic deformation of the crystal. This was tested by measurements of the electrical conductivity of crystals of KCl, KBr, and NaCl under pressure. Crystals with colour centres show a jump increase of 60–100 % and those with uranium centres of 30 %, as compared with colourless crystals.

V. Z.

NORTHUP (M. Allen). *The luminescence of calcite.* Rocks and Minerals, Peekskill, N.Y., 1940, vol. 15, pp. 147–157.

Observation of luminescence in calcites from different localities show that they can be divided approximately into four groups: those showing (1) red fluorescence and phosphorescence due to the manganese content; (2) green fluorescence and phosphorescence destroyed by heat and thought to be due to the inclusion of an oily hydrocarbon; (3) yellow fluorescence produced by heat, which tends to destroy phosphorescence; (4) phosphorescence as well as fluorescence (when present) intensified by heat. Different types of lamp were used to obtain the desired results.

J. M. S.

IWASE (Eiichi). *On the fluorescence spectrum and composition of scapolite*. Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1940, vol. 37, pp. 58-64, 5 figs.

The fluorescence of scapolite from Grenville, Quebec [M.A. 4-212], is more intense than that of scapolite from North Burgess, Ontario, and the bands in the spectrum lie in the longer wave-length region. The fluorescence is due to the presence of uranium, and the position of the bands is evidently due to the difference in composition of the scapolite, that from Grenville being $\text{Me}_{70}\text{Ma}_{30}$ (from d_4^{16} 2.72) and that from North Burgess $\text{Me}_{36}\text{Ma}_{64}$ to $\text{Me}_{42}\text{Ma}_{58}$. L. J. S.

WILLIAMSON (W. O.). *The reversible darkening in daylight of some glazes containing titanium*. Trans. Brit. Ceram. Soc. Stoke-on-Trent, 1940, vol. 39, pp. 345-368, 2 figs.

Describes the reversible darkening in daylight of glazes containing rutile and gives more technical details than in the previous paper [Min. Mag. 25-513]. F. A. B.

X-rays and Crystal-structure.¹

BRILLOUIN (Léon). *Diffusion de la lumière et des rayons X par un corps transparent homogène: influence de l'agitation thermique*. Ann. Physique, Paris, 1922, ser. 9, vol. 17, pp. 88-122, 4 figs.

A theoretical investigation of the effect, in terms of light and X-ray scattering, of the existence of thermal waves of compression in a homogeneous elastic solid. Calculation shows that when X-rays are incident upon a crystalline substance, the following kinds of scattering must coexist: (1) Selective reflection of the X-rays by the crystallographic planes, in accordance with the Bragg relation. (2) Intense scattering around the central spot. (3) Diffuse scattering surrounding and enlarging each Bragg spot. (4) Weak general scattering in all directions. These results are not in accordance with the conclusions of Debye (Ann. der Physik, 1914, vol. 43, pp. 49-95), who found only a falling-off of intensity of the Bragg spots with rise of temperature, plus a general diffusion which increases with rise of temperature but is independent of crystal orientation. K. L.

¹ In this set of 29 abstracts of papers describing recent work and ideas on the scattering of X-rays in crystals, assistance has been generously given by Mrs. Kathleen Lonsdale. A forthcoming number of Proc. Roy. Soc. London contains a further series of papers on this subject.

FAXÉN (Hilding). *Die bei Interferenz von Röntgenstrahlen infolge der Wärmebewegung entstehende Streustrahlung*. Zeits. Physik, 1923, vol. 17, pp. 266-278, 3 figs.

A mathematical investigation, illustrated by reciprocal lattice diagrams, of the X-ray scattering resulting from the heat motion in crystals. Only the case of a simple cubic lattice with spherical symmetry of the elastic constants is fully considered, but both transverse and longitudinal waves are taken into account. It is concluded that if an X-ray beam, wave-length λ , is incident on a set of planes, of spacing a , of a cubic lattice, at a glancing angle θ , then the maximum intensity of scattering due to the heat waves occurs in a direction which lies in the plane of incidence and at a glancing angle θ_1 such that $a(\sin \theta + \cos \theta \tan \theta_1) = \lambda$. If monochromatic radiation is used the maximum intensity of thermal X-ray scattering is found in the same position as the Laue reflections [here Faxén means what are usually now called the *Bragg* reflections, the selective reflections of characteristic radiation according to the Bragg law] and will lead to a weak diffuse scattering surrounding each such reflection. If, however, continuous X-radiation is used, then a continuous stream of intensity maxima will occur, forming radial streaks on Laue photographs, which will not only extend from the central spot to the Laue spots but even beyond them. Such an asterism was observed by Friedrich in 1914.

K. L.

WALLER (Ivar). *Theoretische Studien zur Interferenz- und Dispersions-theorie der Röntgenstrahlen. Part I. Über den Einfluss der Wärmebewegung der Kristallatome auf die mit einem kleinen Kristallstück hervorgebrachten Röntgeninterferenzbilder*. Uppsala Universitets Årsskrift, Matematik och Naturvetenskap, I, 1925, pp. 1-58.

A much more rigorous development according to quantum statistics of a general formula for the scattering of X-rays due to the heat motion of crystals; still assuming, however, complete regularity of the atomic forces and of the atomic cross-section (that is, neglecting any deformation of the atom caused by the heat motion). The higher the temperature, therefore, the more uncertain is the application of the formula. The main results, however, are the same as those of Faxén: The Laue [Bragg] reflections have sharp maxima which *decrease* in intensity with rise of temperature. The thermal X-ray scattering has diffuse maxima which *increase* in intensity with rise of temperature. The maximum intensity of thermal scattering occurs at the positions where the Bragg

condition is fulfilled. A broadening of the lines on powder photographs, due to thermal motions, is to be expected. The theory is probably not applicable where the crystal blocks are of linear dimensions greater than 10^3 to 10^4 Å.

K. L.

PRESTON (G. D.). *Diffraction of X-rays by crystals at elevated temperatures*. Proc. Roy. Soc. London, Ser. A, 1939, vol. 172, pp. 116–126, 5 pls., 10 text-figs.

Diffuse spots appear on Laue photographs of single crystals of aluminium, rock-salt, and periclase which increase in intensity when the temperature is raised to 500° C. Their presence can be explained by the thermal vibrations of the lattice which break the crystal up into groups, consisting probably of an atom and its twelve neighbours (in the case of aluminium). 'The thermal vibrations cause the interatomic distances to vary slightly from one group to another so that new diffraction maxima characteristic of the group of atoms, are produced.'

F. A. B.

MAUGUIN (Charles) & LAVAL (Jean). *Réseau de Fourier et agitation thermique*. Compt. Rend. Acad. Sci. Paris, 1939, vol. 208, pp. 1446–1450.

The Fourier series for representing the structure amplitude of a crystal-structure is extended to include thermal perturbations and hence to the study of diffuse reflections of X-rays.

F. A. B.

LAVAL (Jean). *Diffusion des rayons X par les cristaux en dehors des directions de réflexion sélective*. Compt. Rend. Acad. Sci. Paris, 1939, vol. 208, pp. 1512–1514, 2 figs.

Ionization-chamber measurements of the intensity of X-ray reflection in the neighbourhood of strong reflections from a crystal of sylvine are used to plot isodiffusion surfaces around each lattice point involved. An explanation is given of the four maxima and minima observed in the isodiffusion surfaces of (006). The diffuse reflections are attributed to thermal agitations which are greater for sylvine than for diamond.

F. A. B.

KNAGGS (I. E.), LONSDALE (K.), MÜLLER (A.), & UBBELOHDE (A. R.). *Anomalous X-ray reflections on Laue photographs*. Nature, London, 1940, vol. 145, p. 820, 3 figs.

Laue photographs of benzil show very clearly the anomalous reflec-

tions already reported by other workers. Attention is drawn to the important fact that these reflections are much less sensitive to crystal mis-setting than are the ordinary Laue reflections. F. A. B.

LONSDALE (K.), KNAGGS (I. E.), & SMITH (H.). *Diffuse reflection of X-rays by single crystals*. Nature, London, 1940, vol. 146, pp. 332-333.

When a principal crystal axis of the specimen yielding diffuse reflections is vertical most of the diffuse spots are nearly coincident with those of Bragg spots on the corresponding oscillation photograph covering a range of $10-15^\circ$ on each side of the stationary position for the Laue photograph. At liquid-air temperatures the diffuse spot pattern almost completely disappears. At high temperatures the diffuse spot pattern is relatively enhanced. The size of the diffuse spots shows that they are not given by small crystal units. F. A. B.

BRAGG (Sir William). *The extra spots of the Laue photograph*. Nature, London, 1940, vol. 146, pp. 509-511, 2 figs.

By assuming the presence of sufficient groups of regularly arranged scattering points, each group acting independently of each other, the approximate positions of the diffractions can be calculated and shown to agree in position with the diffuse spot pattern obtained by previous workers. A formula is derived for the intensity of X-rays scattered from a group of eight atoms arranged at the corners of a cube which yields positions in agreement with those observed for a single crystal of KCl. F. A. B.

LONSDALE (Kathleen). *Diffuse reflections on Laue photographs*. Nature, London, 1940, vol. 146, p. 806.

Further data are cited in support of the previous work of Laval [M.A. 7-488] and Preston (see above) that diffuse reflections are definitely due to a temperature effect, although the exact relation of the thermal movements of the particles to the structure and the elastic constants is not yet worked out. F. A. B.

RAMAN (Sir C. V.) & NATH (N. S. N.). *Quantum theory of X-ray reflection and scattering. Part I. Geometric relations*. Proc. Indian Acad. Sci., Sect. A, 1940, vol. 12, pp. 83-92, 5 figs.

The excitation of the characteristic vibrations of a crystal lattice by

X-rays is best considered, in the same way as the phenomenon of scattering of light in crystals with diminished frequency, as a quantum-mechanical effect. The following is from the authors' summary. 'From the equations for the conservation of energy and momentum, the geometrical relations entering in this effect are deduced theoretically for the two cases in which the lattice vibrations fall within (1) the acoustic range of frequency and (2) the optical range. In the first case, the incident X-rays are scattered in directions falling within a cone having the incident ray as axis and with a semi-vertical angle $2 \sin^{-1} \lambda / 2. \lambda^*$ where λ^* is the minimum acoustical wave-length. In the second case, we have a quantum-mechanical reflection of the X-rays with diminished frequency in a direction which generally follows the geometrical formula $2d \sin \frac{1}{2}(\theta + \phi) = n\lambda$ where θ and ϕ are the glancing angles of incidence and reflection on the crystal spacings. For crystals with specially rigid bindings, the alternate formula $d \sin(\theta + \phi) = n\lambda \cos \phi$ is indicated as being more appropriate. In either case, the intensity of the reflection should fall off rapidly as θ and ϕ diverge.'

F. A. B.

RAMAN (Sir C. V.) & NILAKANTAN (P.). *Reflection of X-rays with change of frequency. Part I. Theoretical discussion.* Proc. Indian Acad. Sci., Sect. A, 1940, vol. 11, pp. 379-388. *Part II. The case of diamond.* pp. 389-397, 3 pls. *Part III. The case of sodium nitrate.* pp. 398-408, 5 pls. *Part IV. Rock-salt.* Ibid., 1940, vol. 12, pp. 141-156, 4 pls., 3 text-figs.

The theory outlined in the preceding abstract is elaborated and its analogy with the Compton effect discussed. Many reproductions of Laue photographs showing diffuse spots are given. Diamond photographs show in addition a diffuse halo about the primary beam about half-way between the centre and a circle passing through the three (111) Laue spots. 'This is supposed due to acoustic waves of high frequency excited by the incident monochromatic X-rays and reflecting them in the usual way.' The temperature effects observed with sodium nitrate show that a diminution in the intensity of the unmodified reflection is accompanied by an increase in the intensity of the modified reflection. The striking photographs of rock-salt can be simply interpreted by considering the oscillation of the interpenetrating lattices of sodium and chlorine ions. This would modify the structure amplitudes of the rock-salt in such a way that the halved spacings which yield strong unmodified reflections would also give strong modified reflections in the same order of relative intensity.

F. A. B.

RAMAN (Sir C. V.) & NILAKANTAN (P.). *A new X-ray effect*. Current Science, Bangalore, 1940, vol. 9, pp. 165-167, 1 fig.

These authors explain the diffuse spots on a Laue photograph of diamond as due to lattice vibrations excited by the incident X-rays. It is shown how a quantum view-point is essential for the phenomenon and explains how the diffuse spots are so readily detected. The intensity of the diffuse spots due to modified frequencies falls off rapidly with increasing inclination of the phase-waves to the (111) reflections.

F. A. B.

RAMAN (Sir C. V.) & NATH (N. S. Nagendra). *The two types of X-ray reflection in crystals*. Proc. Indian Acad. Sci., Sect. A, 1940, vol. 12, pp. 427-439, 1 fig.

'The X-ray reflections of the Laue type are elastic collisions of the photons with the crystal considered as a structure with static space periodicities. The modified or quantum reflections are inelastic collisions in which the photon excites the vibration of the crystal lattice and is itself reflected by the dynamic stratifications of electron density arising from such vibrations.' 'The influence of temperature on the intensity of quantum reflection is very different in the two cases where $h\nu^* \gg \kappa T$ and $h\nu^* \ll \kappa T$ where ν^* is the optical frequency of the lattice vibration.'

F. A. B.

BHAGAVANTAM (S.) & BHIMASENACHAR (J.). *Modified reflection of X-rays by crystals: calcite*. Proc. Indian Acad. Sci., Sect. A, 1940, vol. 12, pp. 337-339, 1 fig.

An account of diffuse X-ray reflections from calcite. The positions of the modified reflections due to Cu-K α and Cu-K β radiations agree well with Raman's formula $2d \sin \frac{1}{2}(\theta + \phi) = \lambda$.

F. A. B.

SIRKAR (S. C.) & GUPTA (J.). *On the new diffraction maxima in Laue photographs*. Proc. National Inst. Sci. India, 1940, vol. 6, pp. 705-712, 3 figs.

Discusses the theories of Raman and Zachariasen. The diffuse spots on diamond photographs can be explained by the thermal vibrations of the lattice.

F. A. B.

EWALD (P. P.). *X-ray diffraction by finite and imperfect crystal lattices*. Proc. Physical Soc. London, 1940, vol. 52, pp. 167-174, 1 fig.

‘The Fourier transform of a crystal is a representation which, if fully known, would be equivalent to the usual description of a crystal. At the same time the Fourier transform is very closely related to the diffraction properties and it offers the best survey of the diffraction data obtained, and of those missing, for a discussion of crystal shape and of crystal imperfection.’
F. A. B.

ZACHARIASEN (W. H.). *A theoretical study of the diffuse scattering of X-rays by crystals*. Physical Rev. (Amer. Phys. Soc.), 1940, vol. 57, pp. 597-602, 2 figs.

SIEGEL (Stanley) & ZACHARIASEN (W. H.). *Preliminary study of new diffraction maxima in X-ray photographs*. Ibid., pp. 795-797, 4 figs.

The Debye formula for diffuse scattering is replaced by a more complicated expression which predicts the existence of intensity maxima for monochromatic radiation. The author does not accept Preston’s interpretation of the diffuse spots on Laue photographs of single crystals of substances at high temperatures, but shows that experimental data obtained on rock-salt in the second paper are in general agreement with his own theory.
F. A. B.

JAHN (H. A.) & LONSDALE (K.). *Diffuse reflections from diamond*. Nature, London, 1941, vol. 147, pp. 88-89, 1 fig.

Monochromatized X-ray photographs of diamond within given angular limits yield a threefold diffuse spot pattern near the true Laue spot. Preliminary calculations based on Waller’s formulae yield results in agreement with experiment and also explain the nearby circular diffuse spot obtained by Raman for a different angular setting of diamond.
F. A. B.

RAMAN (Sir C. V.) & NILAKANTAN (P.). *Quantum X-ray reflection in diamond*. Nature, London, 1941, vol. 147, pp. 118-119.

As the characteristic temperature of diamond is high the intensity of the diffuse reflections should not be markedly changed by change of temperature. This has been confirmed.
F. A. B.

JAUNCEY (G. E. M.). *Note on the theory of the modified reflection of X-rays by crystals*. Physical Rev. (Amer. Physical Soc.), 1941, vol. 59, pp. 456-458, 1 fig.

— *The extra spots in Laue photographs*. Nature, London, 1941, vol. 147, p. 146.

The formula obtained by W. H. Bragg yields a modified equation identical with those of Zachariasen and of Raman and Nath based on quite different assumptions. F. A. B.

PRESTON (G. D.). *Diffuse reflexion of X-rays*. Nature, London, 1941, vol. 147, pp. 358-359, 2 figs.

An alternative treatment of Faxén's formula showing that it predicts correctly, as Jauncey found, the diffuse spots on the author's photograph of aluminium as well as does the Bragg equation. F. A. B.

PRESTON (G. D.). *Diffuse reflexion of X-rays*. Nature, London, 1941, vol. 147, pp. 467-471, 3 figs.

A résumé of the subject from the early work of Faxén (1923) up to a recent discussion held by the Royal Society. The author clearly discriminates between the three main theories which have been advanced to explain the phenomenon of diffuse reflection. F. A. B.

LONSDALE (K.). *Diffuse X-ray reflexions*. Nature, London, 1941, vol. 147, pp. 481-482, 1 fig.

An explanation of how different theories, all assuming that the spreading of the intensity of reflecting power around each reciprocal lattice point is independent of direction, lead to the correct prediction of the positions of diffuse X-ray reflections. Only further experimental data, e.g., relating the surfaces of isodiffusion for various reciprocal lattice points with other physical properties such as temperature, elasticity, &c., can decide between them. F. A. B.

JAHN (H. A.). *Diffuse reflexion of X-rays*. Nature, London, 1941, vol. 147, p. 511, 1 fig.

It is emphasized that although the Preston-Bragg formula and the Faxén-Waller theory predict Preston's experimental results (see previous abstract) equally well, the two expressions are based on irreconcilable theories. Work so far carried out on the isodiffusion

surfaces for points in the reciprocal lattice of sodium confirms Laval's data and lends support to the Faxén-Waller theory. F. A. B.

SIEGEL (Stanley). *Experimental study of the diffuse scattering of X-rays by potassium chloride crystals*. Physical Rev. (Amer. Physical Soc.), 1941, vol. 59, pp. 371-375, 5 figs.

A study of the diffuse reflections produced by monochromatic X-rays when incident on a single crystal of KCl at room-temperatures. The data obtained are consistent with Zachariasen's theory. F. A. B.

KIRKPATRICK (Paul). *X-ray diffraction maxima at other than Bragg angles*. Physical Rev. (Amer. Physical Soc.), 1941, vol. 59, pp. 452-455, 3 figs.

From ionization-spectrometer measurements on slightly ground and untreated cleavage surfaces of calcite it is concluded that disordered crystal particles are the principal source of reflected intensity of X-rays at other than Bragg angles. F. A. B.

GREGG (R. Q.) & GINGRICH (N. S.). *The diffuse scattering of X-rays by rocksalt*. Physical Rev. (Amer. Physical Soc.), 1941, vol. 59, pp. 619-621, 2 figs.

A 'monochromatic Laue pattern' of rock-salt shows forty diffuse spots, the positions of which agree well with values predicted by Zachariasen's formulae. F. A. B.

JAUNCEY (G. E. M.) & BALTZER (O. J.). *Non-Laue maxima in the diffraction of X-rays from rocksalt-equatorial maxima*. Physical Rev. (Amer. Physical Soc.), 1941, vol. 59, pp. 699-705, 4 figs.

A short summary of previous work, particularly that of J. Laval, on diffuse spots and streaks appearing on Laue photographs. The authors give results from experiments with monochromatic radiation diffracted from an etched cleavage face of rock-salt. The non-Laue spots are called associated Bragg reflections. The observed shift of the maximum intensity of the latter from the corresponding Bragg spectra is less than that implied by the Zachariasen formula. This leads to the conclusion that 'the groups of atoms which give rise to the associated Bragg spots are considerably larger than an atom plus its 12 nearest neighbours as supposed by Preston'. F. A. B.

BUERGER (M. J.). *The photography of interatomic distance vectors and of crystal patterns*. Proc. Nat. Acad. Sci. U.S.A., 1939, vol. 25, pp. 383-388, 1 fig.

— *The correction of X-ray diffraction intensities for Lorentz and polarization factors*. Ibid., 1940, vol. 26, pp. 637-642, 1 fig.

— *Optically reciprocal gratings and their application to syntheses of Fourier series*. Ibid., 1941, vol. 27, pp. 117-124, 4 figs.

By using polaroid strips set at the correct azimuth over each hole of a Bragg plate the phase of each F_{hol} contribution can be adjusted to 0 or π . The idea can also be extended to Patterson and Patterson-Harker syntheses by making the areas of the holes proportional to $|F_{hol}|^2$ or $\sum (\pm 1)^k |F_{hkl}|^2$ respectively. Photographic procedures for producing the requisite gratings are also outlined. The second paper deals with corrections which must be applied to F^2 values, and the author gives a treatment based upon the reciprocal lattice of calculating Lorentz factors for the general-inclination Weissenberg photograph; a rotating cam method can be applied to the correction of a Bragg plate for the Lorentz factor. The third paper gives a reciprocal lattice treatment of the diffraction properties of plane gratings. Two or more parallel gratings are recommended for Harker syntheses each grating having a given general phase. In this way electron density summations of crystal-structures can be effected optically.

F. A. B.

WARREN (B. E.). *X-ray diffraction in random lattices*. Physical Rev. (Amer. Physical Soc.), 1941, vol. 59, pp. 693-698, 4 figs.

Random layer lattice structures are considered which consist of layers arranged parallel and equidistant, but random in translation parallel to the layer, and rotation about the normal. Such a structure will yield only basal (00l) and two-dimensional pinakoid ($hk0$) reflections but no general reflections of the type (hkl). Expressions are calculated for the intensity distribution in a two-dimensional powder reflection, for the integrated intensity, and for the particle-size from the breadth of the peak appearing on a microphometer record. Heat-treated carbon-black yields a powder pattern from which the amount of material present in the form of two-dimensional layers can be deduced. The size of a two-dimensional layer of the carbon-black in the plane of the layer is found to be 64 Å.

F. A. B.

BUNN (C. W.). *Some applications of X-ray diffraction methods in industrial chemistry*. Journ. Sci. Instruments (Inst. Physics, London), 1941, vol. 18, pp. 70-74, 4 figs.

X-ray powder photographs and microscopic examination have elucidated the constitution of bleaching powder, iron oxide pigments, boiler scales, precipitates formed in water softening with sodium aluminate, and the reactions involved in the setting of plaster of Paris. A suggestion is made for arranging all inorganic substances in order of the spacing A . of the crystal plane responsible for the strongest diffraction line on powder photographs. F. A. B.

ROOKSBY (H. P.). *Some applications of the X-ray powder method in industrial laboratory problems*. Journ. Sci. Instruments (Inst. Physics, London), 1941, vol. 18, pp. 84-90, 11 figs.

An account of work, some previously published, on refractory materials including mullite [M.A. 8-14], thermionic cathode coatings, and inorganic luminescent materials. F. A. B.

TAYLOR (A.). *The study of carbon by the Debye-Scherrer method*. Journ. Sci. Instruments (Inst. Physics, London), 1941, vol. 18, pp. 90-94, 5 figs.

A series of natural and artificial graphites have been photographed in a 19 cm. diameter camera with cobalt X-radiation. Microphotometer curves are reproduced and the method of calculating crystallite-size is outlined. 'Some revision of our present ideas on the crystal structure of graphite is indicated.' F. A. B.

DARBYSHIRE (James A.). *Some examples of industrial testing of materials by X-ray diffraction*. Journ. Sci. Instruments (Inst. Physics, London), 1941, vol. 18, pp. 99-100, 1 fig.

Powder photographs are used to follow the reactions which take place inside a lead-acid accumulator. The positive plate of a fully charged cell is coated with PbO_2 , traces of $PbSO_4$, and red PbO . This coating changes to $PbSO_4$ on discharging. A fully charged negative plate is coated with metallic lead and a little $PbSO_4$. F. A. B.

NAGELSCHMIDT (G.). *The identification of clay minerals by means of aggregate X-ray diffraction diagrams*. Journ. Sci. Instruments (Inst. Physics, London), 1941, vol. 18, pp. 100-101.

Fractions of clays and soil colloids of very small grain-size normally

yield powder photographs which can be distinguished from one another only with difficulty. By allowing an aqueous suspension of about 20 mg. clay to evaporate below 50° C. in a 12 mm. diameter glass ring, 7 mm. high, attached with vaseline to a cover slip, strips of the dried clay can be removed from the glass and mounted for X-ray determination. The basal reflections obtained from the ordered aggregates identify the clay mineral and indicate the possibility of developing a quantitative method in which the amounts of various minerals present in a clay sample could be determined from the intensities of the basal reflections. F. A. B.

THEWLIS (J.). *The structure of teeth as shown by X-ray examination.*

Medical Research Council, London, Special report series no. 238, 1940, 82 pp., 9 pls., 37 text-figs. Price 2s. 6d.

An account of seven years' X-ray and optical research on human teeth including work previously published [M.A. 7-352]. The author still adheres to the view that tooth enamel consists largely of hydroxy-apatite and that the carbonate is present as calcite. Of particular interest to mineralogists are the X-ray and chemical data together with reproductions of powder photographs of various apatites. F. A. B.

LIPSON (H.) & PETCH (N. J.). *The crystal structure of cementite, Fe_3C .*

Journ. Iron Steel Inst. London, 1940, vol. 142 (for 1940, no. 2), pp. 95 P-106 P, 4 figs.

Cementite, prepared as a fine powder by passing CO over Fe_2O_3 at 550° C., is orthorhombic with a 4.5144, b 5.0787, c 6.7297 Å., the unit cell containing four molecules Fe_3C ; space-group $Pbnm$. The position of the carbon atoms is now determined from the electron density by the Fourier method. The structure is an almost close-packing of iron atoms with carbon atoms in octahedral interspaces. [M.A. 2-517, 4-361.] L. J. S.

FRONDEL (Clifford). *Unit cell and space group of vrbaite ($\text{Ti}(\text{As},\text{Sb})_3\text{S}_5$), seligmannite (CuPbAsS_3) and samsonite ($\text{Ag}_4\text{MnSb}_2\text{S}_6$).* Amer. Min., 1941, vol. 26, pp. 25-28.

Weissenberg photographs yield a 13.35, b 23.32, c 11.23 Å., space-group $D_{2h}^{18} = Cmca$, for vrbaite from Allchar, Serbia; the unit-cell contents are $21[\text{Ti}(\text{As},\text{Sb})_3\text{S}_5]$. Seligmannite from Bingham, Utah, sp. gr. 5.38, yields a 8.04, b 8.66, c 7.56 Å., space-group $D_{2h}^{13} = Pnmm$;

the unit-cell contents are $4[\text{CuPbAsS}_3]$. An X-ray powder photograph of aikinite differs markedly from those of bournonite and seligmannite, suggesting that the mineral is probably not a member of that group. Samsonite from Andreasberg, sp. gr. 5.51, yields a 10.29, b 8.05, c 6.61 Å., β $87^\circ 58'$; the unit-cell contents are $2[\text{Ag}_4\text{MnSb}_2\text{S}_6]$. The observed sp. gr. of pyrostilpnite Ag_3SbS_3 is 5.94. F. A. B.

[ZHIDANOV (G. S.) & SEVASTYANOV (N. G.)], JIDANOV (G. S.) & SEVASTIANOV (N. G.) ЖИДАНОВ (Г. С.) и СЕВАСТЬЯНОВ (Н. Г.). *X-ray analysis of the crystalline structure of Na_2BeF_4* . Compt. Rend. (Doklady) Acad. Sci. URSS, 1939, vol. 22, p. 170, 1 fig.

ZHDANOV (G. S.) & SEVASTIANOV (N. G.). *Determination of the Bravais lattice and the space group*. Ibid., 1940, vol. 26, p. 80.

Crystals of Na_2BeF_4 , obtained from a solution of BeF_2 containing excess of NaF, have a 10.9, b 6.6, c 4.9 Å., the unit cell containing four molecules. Sp. gr. 2.455, space-group D_{2h}^{16} . L. J. S.

DUBROVO (S. K.). *Roentgenographic investigation of silicic acid gels*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1939, vol. 23, pp. 50–53.

Silicic acid gels prepared from sodium silicate and HCl contain crystallites ($< 10^{-5}$ cm.) of β -cristobalite and tridymite. Heated at 900–950° they show the definite structure of these constituents. L. J. S.

LU (S. S.) & CHANG (Y. L.). *Structure of vitreous silica*. Nature, London, 1941, vol. 147, pp. 642–643, 1 fig.

The position and intensities of the diffraction haloes obtained with silica-glass depend on whether the specimen is powdered or not. When powdered, a glass regains a certain freedom of rearrangement with consequent changes in the crystal-structure. F. A. B.

RICHMOND (W. E.). *X-ray crystallography of shortite*. Amer. Min., 1941, vol. 26, pp. 288–289.

X-ray data for the new mineral shortite [M.A. 7–370]. The orthorhombic unit cell with space-group $D_2^6 = A222$, has a 4.98, b 10.97, c 7.10 Å., containing $2[\text{Na}_2\text{CO}_3 \cdot 2\text{CaCO}_3]$. The specific gravity calculated from X-ray and chemical data is 2.59, and from the specific refractivities 2.591, values in good agreement with a new specific gravity determination 2.60 with the Berman balance. F. A. B.

RICHMOND (W. E.) & WOLFE (C. W.). *Crystallography of dolerophanite*. Amer. Min., 1940, vol. 25, pp. 606-610, 2 figs.

Dolerophane, sp. gr. 4·17, from Mt. Vesuvius, Italy, has a 9·39, b 6·30, c 7·62 Å., β $57^\circ 18\frac{1}{2}'$, space-group $C_{2h}^3 = C2/m$. The unit cell contains $4[\text{Cu}_2\text{SO}_5]$ and Goldschmidt's setting is found to correspond with the X-ray data. Optical data are α 1·715, β 1·820, γ 1·880; $2V$ 85° , positive; $r > v$, very strong, 'crossed' dispersion; pleochroism α deep brown, β ($= b$) brownish-yellow, γ ($: c - 10^\circ$) lemon-yellow.

F. A. B.

WOLFE (C. W.). *The unit cell of dickinsonite*. Amer. Min., 1941, vol. 26, pp. 338-342, 1 fig.

Goniometric measurements of dickinsonite from Poland, Maine [M.A. 4-344], gave in a fresh orientation $a : b : c = 1·6784 : 1 : 2·4814$, β $75^\circ 19'$, and X-ray measurements gave a 16·70, b 9·95, c 24·69 Å. ($a : b : c = 1·695 : 1 : 2·507$). Sp. gr. 3·38. Analysis by F. A. Gonyer gave P_2O_5 40·88, FeO 12·36, MnO 31·91, MgO 1·67, CaO 2·01, Na_2O 7·42, K_2O 1·73, Li_2O 0·20, H_2O 1·82, total 100·00, and the new formula $\text{H}_2\text{Na}_6\text{Mn}_{14}(\text{PO}_4)_{12} \cdot \text{H}_2\text{O}$, of which there are four molecules in the unit cell. The goniometric measurements were confirmed on dickinsonite from Branchville, Connecticut; sp. gr. 3·41.

L. J. S.

KOKKOROS (Peter). *Vergleichende röntgenographische Untersuchung von Arsenaten und Selenaten*. (Skorodit, Strengit, Cadmiumselenat-Dihydrat und Manganoselenat-Dihydrat). Πρακτικά τῆς Ἀκαδημίας Ἀθηνῶν [Praktika Acad. Athens], 1938, vol. 13, pp. 337-344, 3 figs. (German with Greek summary.)

Scorodite from Callington, Cornwall, gave a unit cell, a 8·92, b 10·30, c 10·01 Å., containing 8 mols. $\text{FeAsO}_4 \cdot 2\text{H}_2\text{O}$; space-group V_h^{15} , sp. gr. 3·292. Strengite from Pleystein, Bavaria, gave a 8·65, b 10·06, c 9·845 Å. with 8 mols. $\text{FePO}_4 \cdot 2\text{H}_2\text{O}$ and space-group V_h^{15} . $\text{CdSeO}_4 \cdot 2\text{H}_2\text{O}$ has a 10·42, b 10·71, c 9·365 Å., and $\text{MnSeO}_4 \cdot 2\text{H}_2\text{O}$ a 10·47, b 10·51, c 9·24 Å., both with 8 mols. and space-group V_h^{15} . [M.A. 7-509.]

L. J. S.

ONORATO (E.). *Pesquisas Röntgenographicas sobre a leucita*. Bol. Fac. Phil. Sci. Let. Univ. São Paulo, 1938, no. 10 (Mineralogia no. 2), pp. 3-14, 3 pls., 2 text-figs. (Portuguese, with Latin summary, p. 27.)

Unit-cell dimensions and symmetry of leucite, previously published. [M.A. 7-237.]

F. A. B.

BEEVERS (C. A.) & HUGHES (W.). *The crystal structure of Rochelle salt (sodium potassium tartrate tetrahydrate $\text{NaKC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$)*. Proc. Roy. Soc. London, Ser. A, 1941, vol. 177, pp. 251-259, 3 figs. [M.A. 8-15.]

Cell dimensions of Rochelle salt and of other members of the isomorphous series are:

			<i>a.</i>	<i>b.</i>	<i>c.</i>
K-Na salt	...	...	11.93	14.30	6.17 Å.
Am-Na salt	...	...	12.15	14.40	6.18
Rb-Na salt	...	...	12.05	14.40	6.21

L. J. S.

Miscellaneous.

MATHER (Kirtley F.). *Earth structure and earth origin*. Science, New York, 1939, vol. 89, pp. 65-70.

The stratiform structure of the earth is not inconsistent with the planetesimal hypothesis of its origin, and that theory seems best able to account for mountain and continent making. M. H. H.

McCONNELL (Duncan). *Some isomorphic substitutions in apatite*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1939, vol. 25, pp. 46-50, 2 figs.

Criticism of N. V. Belov and I. D. Borneman-Starynkovich [M.A. 7-351] and further discussion on the structure of carbonate-apatite with carbon replacing both P and Ca [M.A. 7-88, 8-96]. The general formula is written $\text{Ca}_6(\text{P}_{6-y}\text{C}_y)[\text{O}_{26-x}(\text{F},\text{OH})_x](\text{Ca}_{4-z}\text{C}_z)$. L. J. S.

GILEVA (Z. M.) & MELENTIEV (B. N.) Гилева (З. М.) и Мелентьев (Б. Н.). *Arsenic in the apatites of the Khibiny tundras*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1939, vol. 25, pp. 118-119.

In the presence of much phosphoric acid, arsenic was reduced to metal by the Tielo-Bugo reagent (sodium hypophosphite solution + HCl), and the amount found in several samples of apatite from various deposits at Khibina, Kola, was As 0.00006-0.00024%, insufficient to have any deleterious effect in the food industry. L. J. S.

VOLODCHENKOVA (A. I.) & MELENTIEV (B. N.) Володченко́ва (А. И.) и Мелентьев (Б. Н.). *Boron in Chibiny apatites*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1941, vol. 30, pp. 140-143. [M.A. 8-52.]

The amount of B_2O_3 in several samples of apatite from Khibina, Kola,

was found to be 0.0057–0.0162%. It appears to be associated with SiO_2 . Details of the method of analysis (distilling as methyl borate) and checking the results are given. The presence of boron adds to the value of the phosphate as a plant fertilizer. L. J. S.

[SHTANDEL (A. G.)] STANDEL (A. G.) Штандель (А. Г.). *Remains of diatom algae in the crystals of Iceland-spar*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1939, vol. 25, pp. 130–133, 3 figs.

The small amount of residue obtained when pale yellowish calcite from the region of the Lower Tunguska was dissolved in dilute HCl contained a few siliceous shells of diatoms. Flakes of the calcite examined under the microscope also showed the presence of diatoms, sponge spicules, and transparent filaments. L. J. S.

BOROVICK (S. A.) [BOROVIK (S. A.)], PROKOPENKO (N. M.), & POKROVSKAYA (T. L.) Боровик (С. А.), Прокопенко (Н. М.) и Покровская (Т. Л.). *Distribution of indium in rocks*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1939, vol. 25, pp. 618–621.

Indium was determined spectroscopically in the H_2S precipitate. Granites contain $5 \times 10^{-6}\%$ and nepheline-syenite (chibinite) $9 \times 10^{-6}\%$. None was found in basic rocks (gabbro and dunite) and clays. [M.A. 7–310.] L. J. S.

PREOBRAZHENSKY (I. A.) Преображенский (И. А.). *Native iron of the Timan*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 28, pp. 634–637, 6 figs.

Small ($\frac{1}{4}$ – $\frac{1}{2}$ mm.) flakes of metallic iron, together with magnetite, ilmenite, brookite, anatase, &c., were separated from Devonian sandstone and conglomerate in the Timan district, northern Russia. It was perhaps formed by reduction from iron oxides. L. J. S.

CHUKHROV (F. V.), AREST-YAKUBOVITCH (R. E.) [i.e. AREST-YAKUBOVICH (P. E.)], & KOZLOVA (N. A.) Чухров (Ф. В.), Арест-Якубович (П. Е.) и Козлова (Н. А.). *On the composition of jarosites from the deposits of central Kazakhstan*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 28, pp. 829–831.

Jarosite is a characteristic result of weathering of pyrite, and also of marcasite and pyrrhotine, in the ore-deposits of Kazakhstan. Ten detailed analyses of material from several localities show that it is

usually a 'sodium-jarosite' [= natrojarosite] with Na_2O up to 5.69%. It is especially abundant at Maikain, forming concretionary masses a metre across. One of four analyses of material from this locality gave SO_3 32.55, P_2O_5 0.27, As_2O_5 0.04, SiO_2 0.46, TiO_2 0.18, Al_2O_3 0.03, Fe_2O_3 49.20, Mn_2O_3 trace, MgO 0.00, CaO 0.15, PbO 0.06, CuO 0.00, Na_2O 5.16, K_2O 1.10, $\text{H}_2\text{O} +$ 10.40, $\text{H}_2\text{O} -$ 0.05 = 99.65. L. J. S.

CHIRKOV (I. N.) Чирков (И. Н.). *Pentlandite from the copper-nickel deposits of Monche-tundra*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 29, pp. 601-603.

Pentlandite intergrown with chalcopyrite occurs embedded in pyrrhotine at Monche in the Kola peninsula. Nine analyses of separated material gave S 31.89-32.73, Fe 30.74-31.69, Ni 33.45-35.52, Co 1.09-2.92; sp. gr. 5.1. These show a deficiency in sulphur, and the formula is given as $(\text{Fe}, \text{Ni})_9\text{S}_8$ [M.A. 6-409]. Partial oxidation of the ore gives rise to bravoite $(\text{Fe}, \text{Ni})\text{S}_2$ and rarely valleriite as pseudomorphs after pentlandite. Further oxidation gives iron hydroxide and stalactites of morenosite. L. J. S.

FIOLETOVA (A. F.) Фиолетова (А. Ф.). Тантало-ниобаты северного склона Туркестанского хребта. *The tantaloniobates of the northern slope of the Turkestan range*. Труды Инст. Геол. Наук, Акад. Наук СССР, вып. 17, Мин.-Геохим. Сер. no. 4 [Trans. Inst. Geol. Sci., Acad. Sci. U.S.S.R., no. 17, Min.-Geochem. Ser. no. 4], 1940, pp. 33-52.

In pegmatite veins, tantaloniobates carrying some tin first separated, followed by cassiterite carrying some Ta and Nb. Analyses of columbite from: I Kyrk-bulak, II and III Kara-su, IV Altyn-Tau; and V of cassiterite from Kara-su.

	Ta_2O_5	Nb_2O_5	SnO_2	SiO_2	TiO_2	WO_3	FeO	MnO	MgO	CaO	Total	Sp. gr.
I.	28.16	50.90	0.84	nil	1.75	nil	13.93	4.29	n.d.	n.d.	99.87	5.914
II.	19.40	57.28	0.33	0.55	1.78	0.01	13.73	5.31	0.27	0.92	'100.93'	5.761
III.	12.69	61.69	1.11	0.08	0.80	2.80	12.22	9.06	0.09	0.40	100.94	5.737
IV.	12.92	64.76	—	—	—	—	13.55	5.85	—	—	—	5.57
V.	2.34	1.91	81.95	2.07	0.16	7.92	2.58	1.32	n.d.	n.d.	100.48	6.747

II, also Al_2O_3 0.37, Fe_2O_3 0.88. IV, also Fe_2O_3 1.02. V, also PbO 0.23.

L. J. S.

[SHILIN (L. L.)] Шилин (Л. Л.). Рутил из Алтын-Тау в центральных Кызылкумах.—SHILIN (L. L.). *Rutile from Altyn-Tau in central Kyzyl-Kum*. Труды Инст. Геол. Наук, Акад. Наук СССР, вып. 10, Мин.-Геохим. Сер. no. 2, [Trans. Inst. Geol. Sci., Acad. Sci.

USSR., no. 10, Min.-Geochem. Ser. no. 2], 1940, pp. 49-53, 5 figs. (Russian with English summary.)

Prismatic crystals of rutile with much the appearance of cassiterite occur in quartz and pegmatite veins and in the selvages of altered granite in the Altyn-Tau mountain in the Kara-Kalpak republic. Eleven crystal-forms are present and the percentage of their frequency is noted. Prismatic crystals from the pegmatite show a flattened habit. Spectroscopic analysis showed the presence of Sn and Nb. L. J. S.

GYSIN (Marcel) & KOVALIV (Pierre). *Un minéral rare de cuivre et de cobalt provenant du gisement de Meskani (Iran)*. Arch. Sci. Phys. Nat. Genève, 1940, ser. 5, vol. 22, pp. 126-130.

The mineral is grey with conchoidal fracture rapidly blackening on exposure to air and increasing in weight 0.15% in 45 hours. Sp. gr. 6.882 and 7.097 on different samples. Analysis, Cu 59.43, Co 3.95, As 33.72, S 0.25, insol. (quartz) 0.78, gangue (CaCO_3) 1.87, is interpreted as mainly domeykite (Cu_3As) with some safflorite and cobaltite. Since, however, the mineral is anisotropic in reflected polarized light it cannot be the cubic domeykite and it is assumed to be a hexagonal modification. L. J. S.

RODGERS (John). *Distinction between calcite and dolomite on polished surfaces*. Amer. Journ. Sci., 1940, vol. 238, pp. 788-798.

Experimental comparisons were made of the various staining tests (mainly due to J. Lemberg, 1872-92), and the one recommended is that with copper nitrate solution and fixing with ammonia, whereby a deep blue colour is produced on calcite. L. J. S.

KELLEY (Vincent C.). *Iceland spar in New Mexico*. Amer. Min., 1940, vol. 25, pp. 357-367, 3 figs.

JOHNSON (J. Harlan). *Iceland spar in Taos County, New Mexico*. Ibid., pp. 151-152.

A vein or pipe in hornblende-schist in the Copper Mountain mining district is filled with coarsely crystallized calcite, individual crystals weighing 30 tons or more. The material is white, banded pink, or clear and colourless of optical quality. The pipe is surrounded by a zone of brecciated and altered (clayey) rock in which Ni, Ba, Bi, Cr, Mo were found spectroscopically. In the calcite there are veinlets of chalcopyrite. The pipe is thought to be an explosion conduit later filled by hydrothermal action. L. J. S.